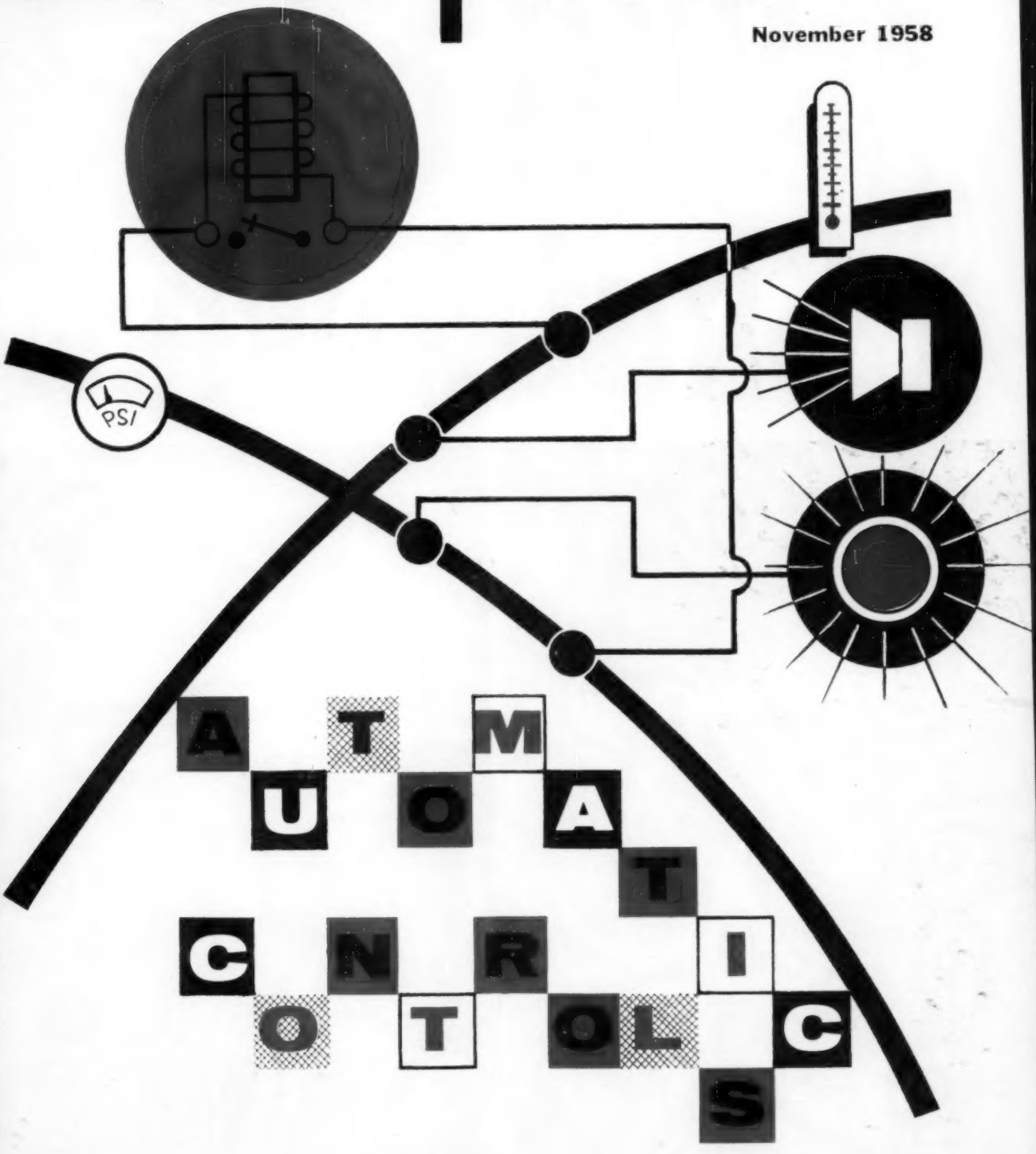
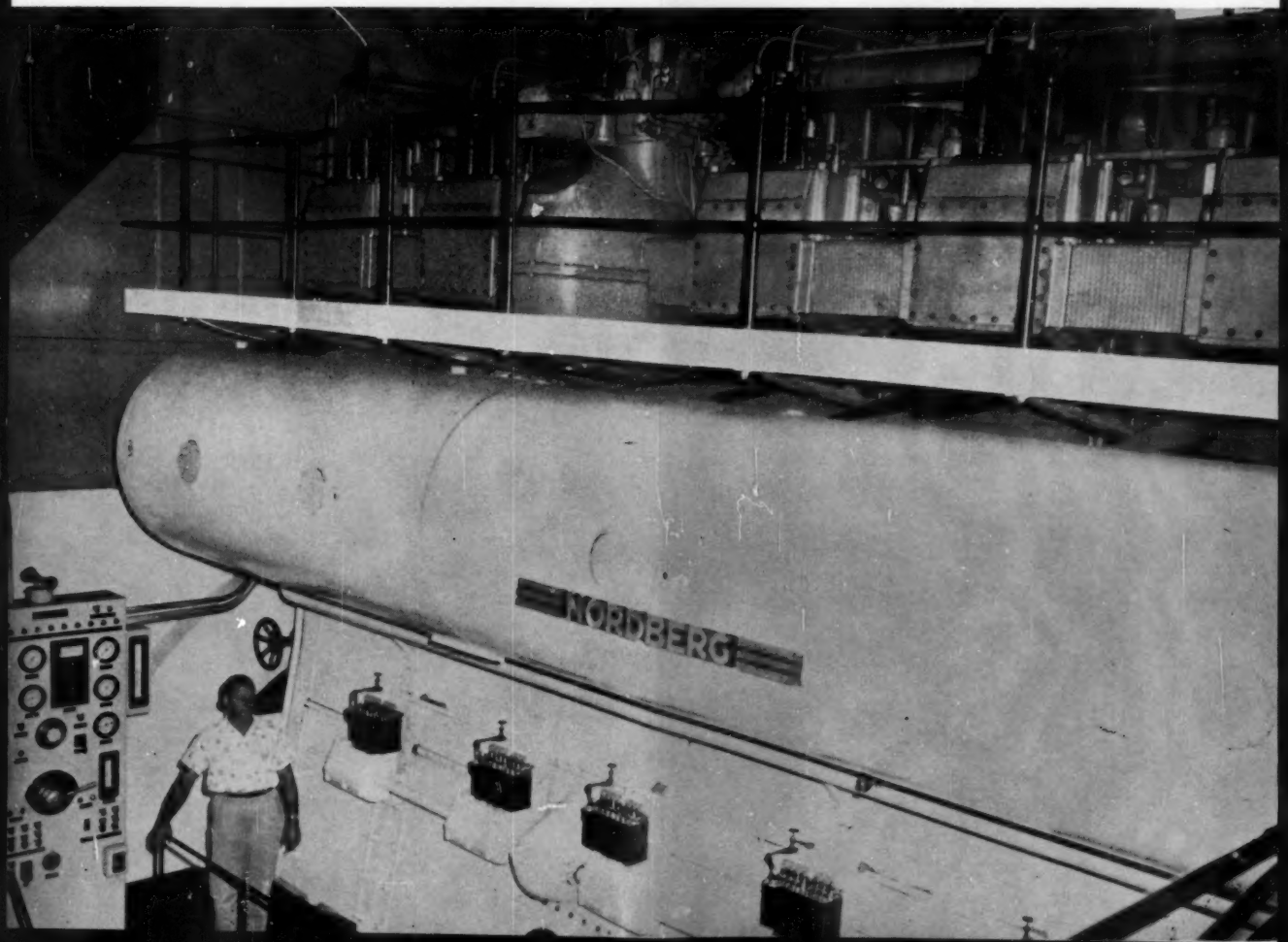
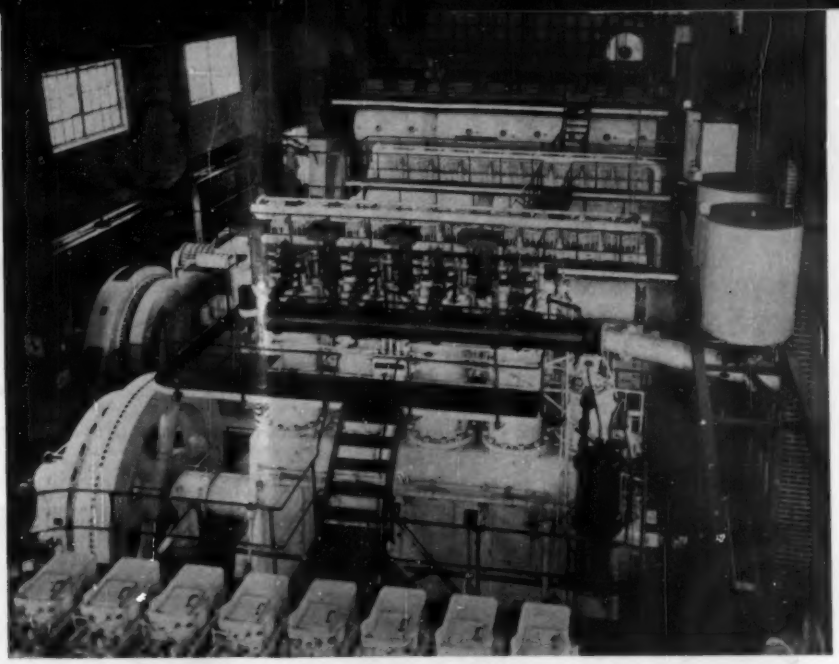
diesel power

November 1958



8,000 Hours Without Shutdown...





THANKS TO TEXACO LUBRICATION

"I've never seen a cleaner engine. Wear is negligible."—reports Fred Gossett, Superintendent of Vero Beach, Florida, power plant

"We recently shut down our 10-cylinder Nordberg diesel engine for inspection after 8,000 hours of operation," says Mr. Gossett. "Like the other five engines we've put on Texaco Ursa Oils, this one was outstandingly clean, free from deposits and wear, and had been a real miser with fuel."

This performance record, which was expected on the basis of previous experience with Ursa Oils, is one reason why the entire Vero Beach power plant is 100% Texaco lubricated.

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For over 20 years, more stationary diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

You see, Texaco Ursa Oils are especially refined to give you *more power* with *less fuel* over *longer periods* between overhauls, in all diesel, gas and dual-fuel engines. Your Texaco Lubrication Engineer will gladly help you select the oil best suited to your engines.

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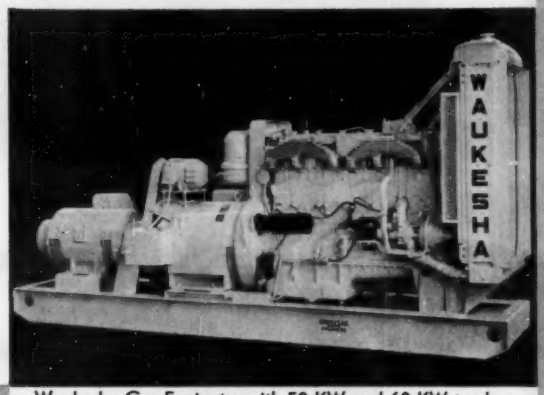
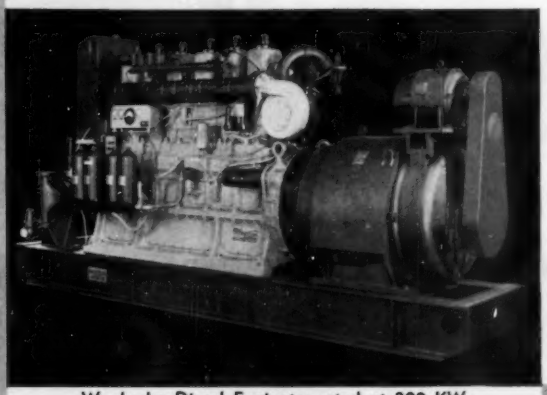


Waukesha Gas Enginator with 50 KW and 60 KW tandem generators for St. Catherine's Hospital—Kenosha, Wisconsin



Waukesha Diesel Enginator rated at 300 KW for the Lutheran Hospital—Cleveland, Ohio

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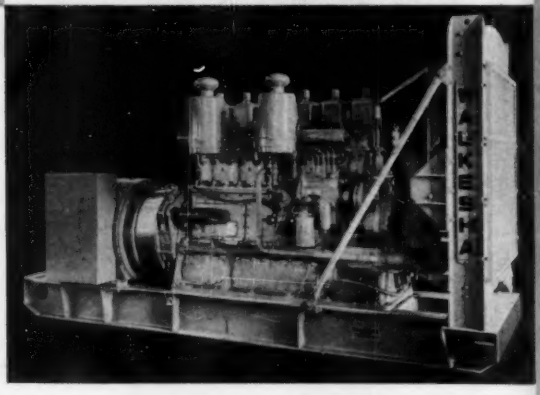
Waukesha Diesel Enginator rated at 250 KW for the Fresno County General Hospital—Fresno, California



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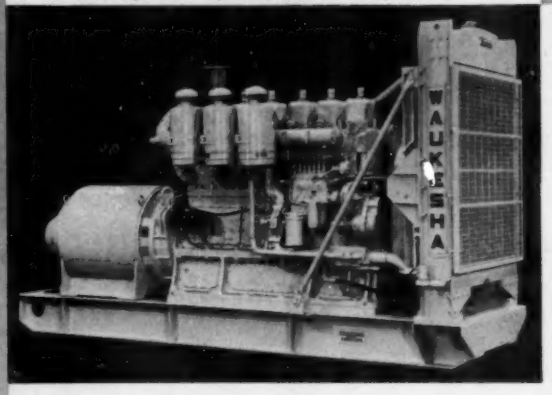
Waukesha Diesel Enginator rated at 300 KW for St. Joseph's Mercy Hospital—Pontiac, Michigan



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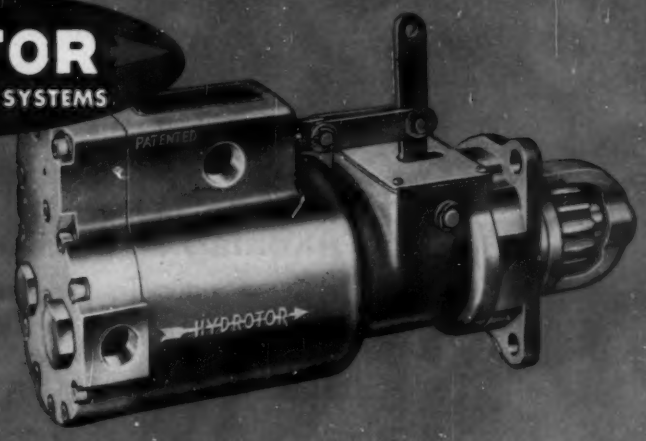

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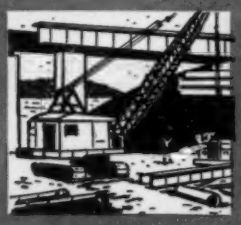
FOR CONSTRUCTION

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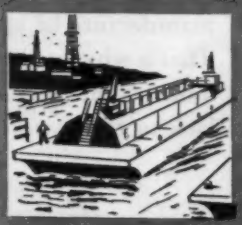
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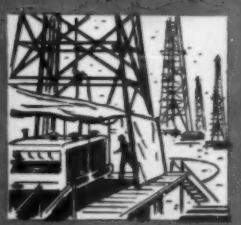
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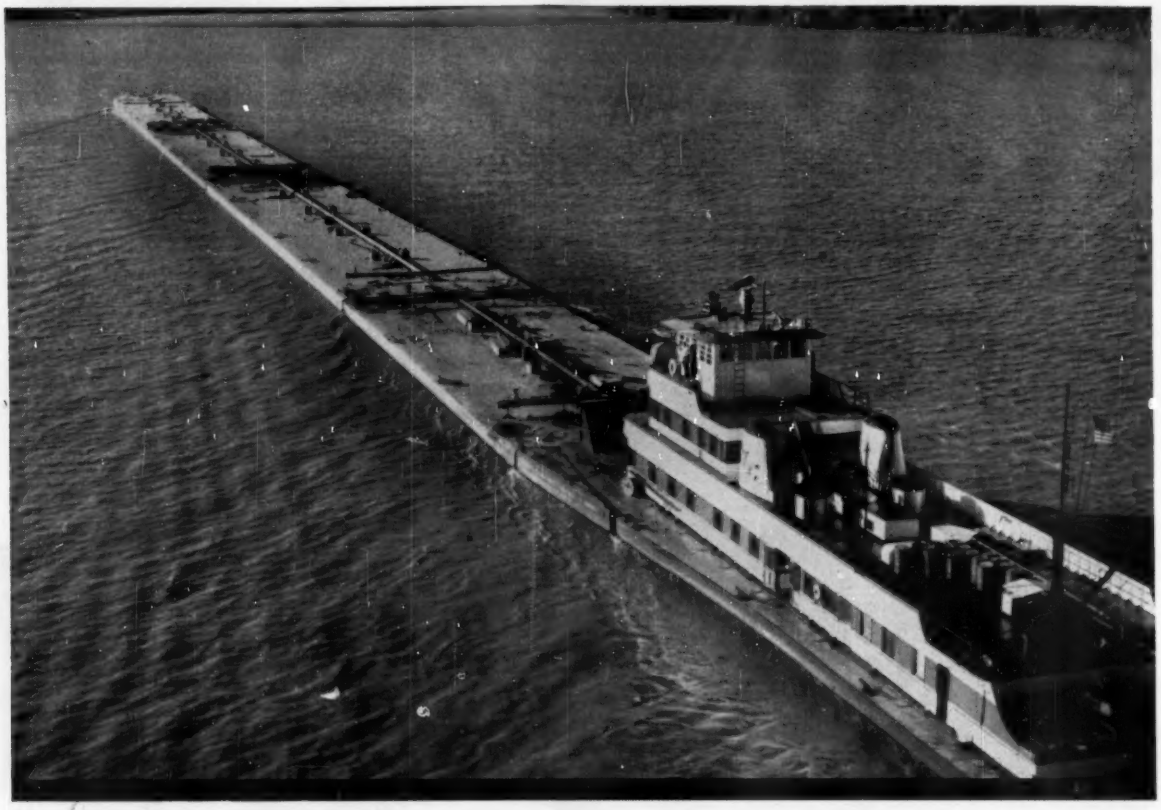

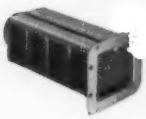

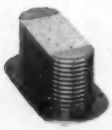

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German Representative
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Publisher
G. Renfrew Brighton

Assistant Publisher
Wilbur W. Young

Subscription Rates

	Single Copies	1 year	2 years	3 years
U. S.	75¢	$4.00	$7.00	$ 9.00
Canada	75¢	4.00	7.00	9.00
Foreign	$1.50	8.00	13.00	17.00

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Diesel Power is indexed regularly by Engineering Index, Inc. and is available in microfilm editions from University Microfilms, Inc., Ann Arbor, Michigan.

DIESEL POWER, for November, 1958, Vol. XXXVI, No. 11. It is published monthly by **DIESEL PUBLICATIONS, INC.**, Executive and Editorial Offices at **80 LINCOLN AVE., STAMFORD, CONN.** Tel. DAvis 4-2131. Entered as second class matter at the Post Office, Kutztown, Pa., under Act of March 3, 1879. Copyright 1958, Diesel Publications, Inc.

BPA

diesel power

Established in 1923 Vol. 36, No. 11 November, 1958

The Magazine of Piston and Turbine Power

Editorial

Keep Your Sights High 13

Articles

Standby Units Give Protection Plus 16
Nantucket Utility Goes Automatic 20
American Bosch Introduces The "PSH" 24
New IH Engines Now In Production 28
Panel-Type Oil-Bath Air Filter For Locomotives 30
Pumping "Package" Is Versatile 32
Plan Now For Future Flood Control 33
Training Men For Today's Construction Needs 35
Cutting Corners Can Be Costly 36
Wrap-Around Insulation Confines Exhaust Heat 37
Clean Air Cuts Costs 38

Departments

Highlights 15
Service Section 39
Industry News 40
New Products 44
People and Plants 48
New Literature 52
Advertisers Index 58

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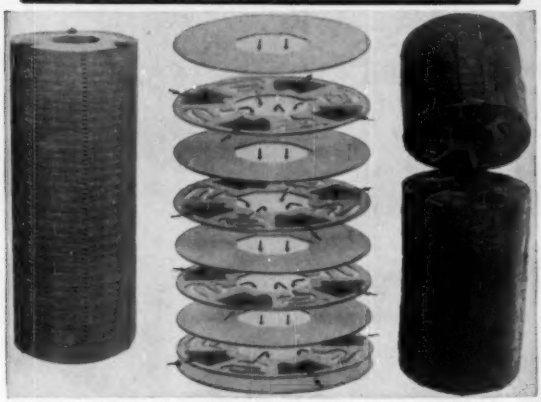

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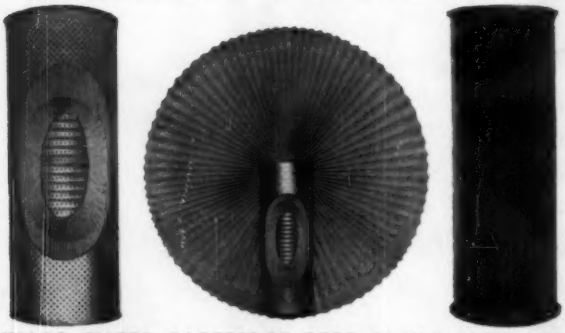

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The Engineer's Field Report

CASE HISTORY
PRODUCT Chevron Starting Fluid
FIRM Great Northern Railway Havre, Montana

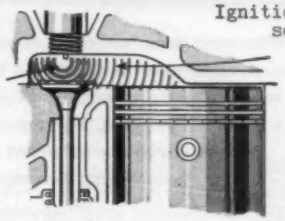
Special fluid starts 250-ton crane instantly, saves time in emergencies—even at 50° below

GREAT NORTHERN RAILWAY'S 250-TON, RAILROAD CRANE (above) starts instantly with Chevron Starting Fluid in temperatures ranging to 50° below zero—even after standing idle for months at a time. Former steam-powered wrecker equipment took crew 12 hours to start. This crane with its two 174 h.p. Cummins diesel engines is now available for derailment emergencies on short notice.

"Slow-grind starts on battery power alone waste too much valuable time. Chevron Starting Fluid fires these engines 'right now'—in any weather." A Great Northern engineer shows how simple it is to insert 7CC gelatin capsule of Chevron Starting Fluid in unit's air-intake system. Fluid is also available in 17CC capsules and 1-pint cans.

Why Chevron Starting Fluid starts engines instantly

Highly volatile: 7 times more than gasoline



Ignition temperature several hundred degrees lower than diesel fuel

Contains wear-reducing lubricants

Additives inhibit ice formation

CHEVRON STARTING FLUID

TRADEMARK "CHEVRON" AND DESIGN REG. U. S. PAT. OFF.

FREE FOLDERS tell more about the Chevron Starting Fluid and Chevron Pressure Primer System. Write or ask for them.

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says Mr. Merle W. Bogan, Service Manager, Smith's Transfer, Staunton, Va.

PART of the operating terrain of Smith's Transfer—between Staunton, Va. and Charleston, W. Va.—is recognized by truck manufacturers and fleet operators as just about the toughest in the country . . . grueling mountain territory that demands maximum air filter and engine efficiency.

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Let a Purolator engineer demonstrate, without obligation, the advantages and economies of air filtration for your particular fleet requirements.

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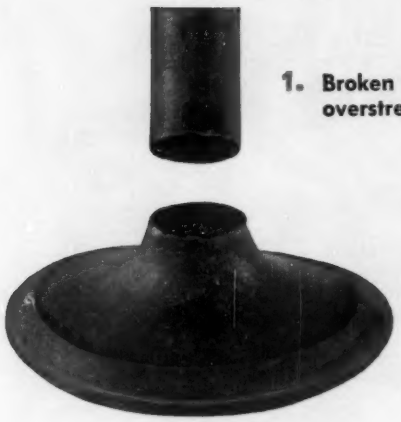

1. Broken valve due to overstressing.

2. Corrosion and cracking of the valve face caused by leakage.

3. Corrosion of the valve face due to sticking caused by stem and guide deposits.

4. Actual melting of valve material due to extremely high temperatures caused by preignition.

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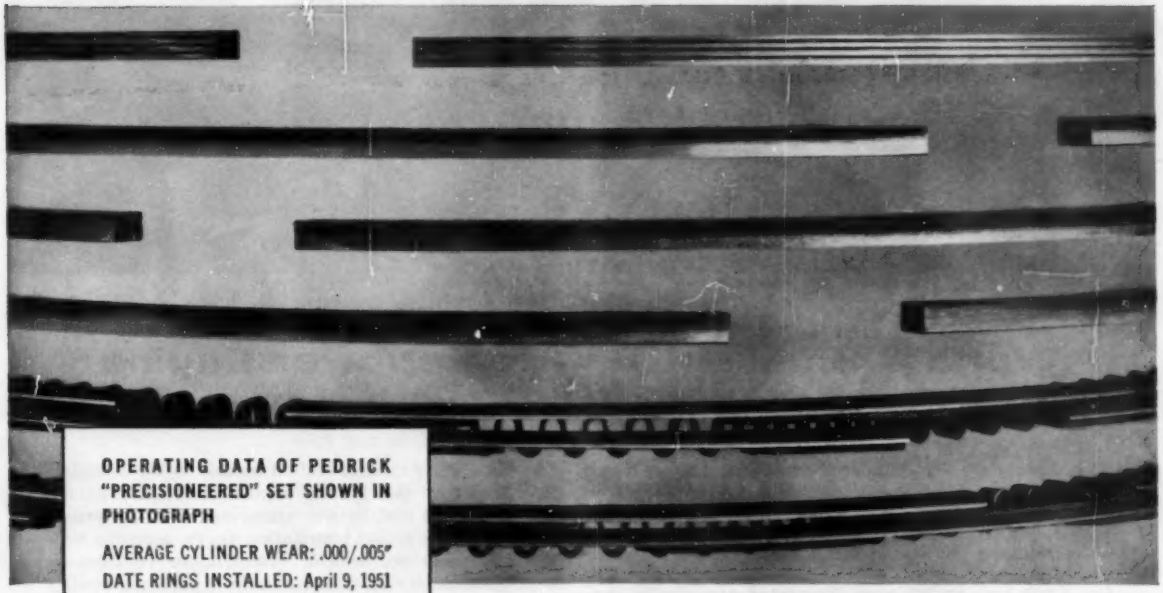
40,622 hours of operation

. . . an average of 6,350 h.p. hrs. per gal. total lube oil consumption.

The photograph shows Pedrick Piston Rings removed from a Cooper-Bessemer GMVTF 10 cylinder engine after 40,622 hours of operation. Note carefully how the face-wear on the rings (the bright area) extends only half way up. After more than six years of *full load* service, these Pedrick rings are practically as good as new.



OPERATING DATA OF PEDRICK "PRECISIONEERED" SET SHOWN IN PHOTOGRAPH

AVERAGE CYLINDER WEAR: .000/.005"
DATE RINGS INSTALLED: April 9, 1951
DATE RINGS REMOVED: June 27, 1957
TYPE LUBE OIL: DTE No. 3 MAGNOLIA
RATED HORSEPOWER: 1100
MAXIMUM OVERLOAD: 10%
LUBE OIL CONSUMPTION: CRANKCASE—39,600 H.P. Hours per Gal. LUBRICATORS—(14 qts. per day) 7,530 H.P. Hours per Gal.
TOTAL LUBE OIL CONSUMPTION (CRANKCASE AND LUBRICATORS): 6,350 H.P. Hours per Gal.

For longer life at full power, make Pedrick "Precisioneered" Piston Ring Sets your *standard* replacement sets. You'll find your Pedrick engineer will be glad to call and help you solve any special problems. Write, wire or phone:
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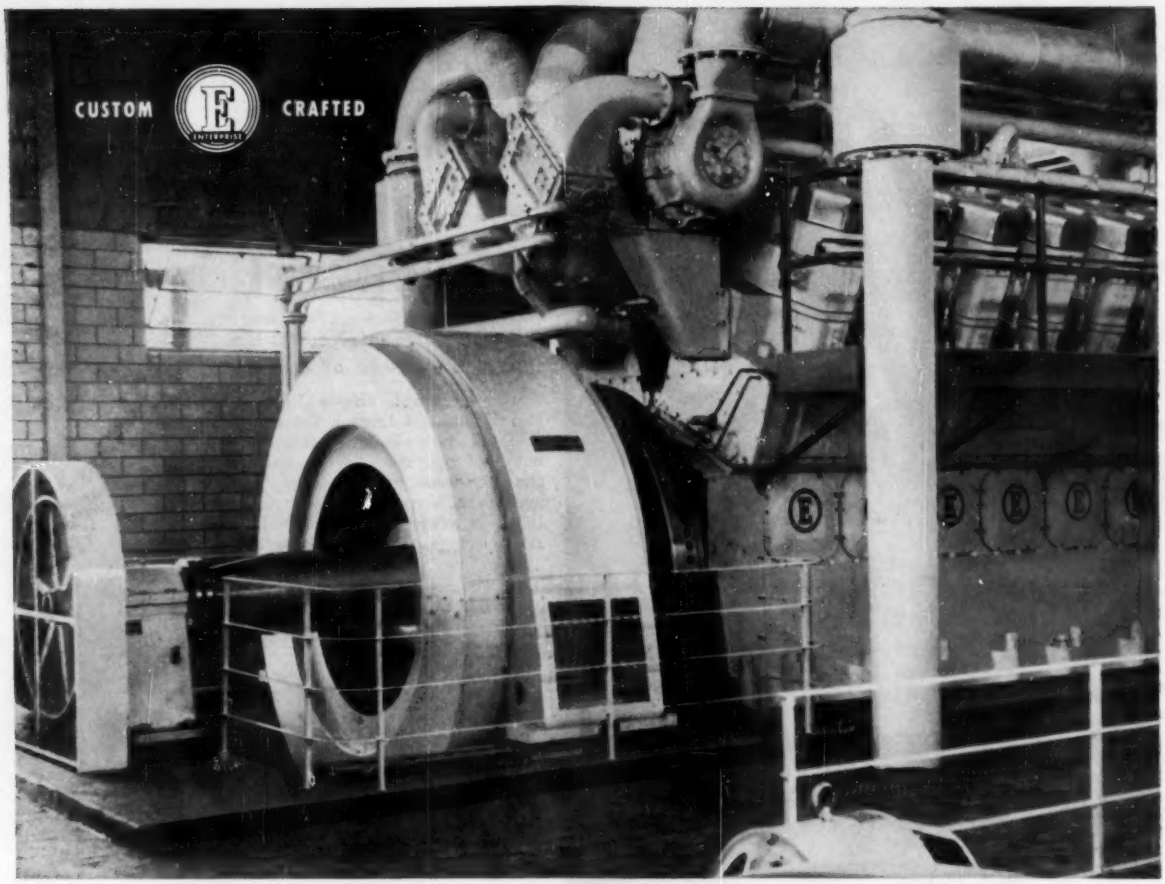
Pedrick PISTON RINGS

PEDRICK PIONEERED CONFORMABLE PISTON RINGS FOR BIG-BORE ENGINES



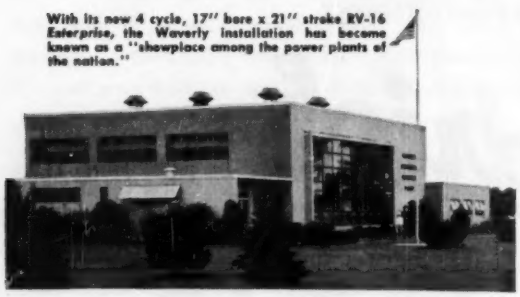
World's Smallest Big-Horsepower Engine Now at Work for Waverly, Iowa

This Enterprise 16-cylinder Turbocharged Dual Fuel Engine is now "on the line" for the Municipal Electric Utility of Waverly, Iowa. It is the largest, most powerful engine ever built by Enterprise—yet its dimensions and weight make it the world's smallest engine in relation to its horsepower output. The Waverly engine is rated 4,890 hp—3,500 kw—at 360 rpm. Top-rated capacity of the RV: 7700 hp at 400 rpm.

Located in Waverly's West Light Plant, the Enterprise unit more than doubles the previous kw capacity of this facility, and is also generating more power than the city's East Plant with its 4 engines and 3 hydro units.

As with other custom-crafted models in the complete Enterprise line, this 110-ton engine offers many advantages which cut installation, operating and maintenance costs. Less bulk makes installation easier, servicing simpler and more economical. Maintenance requires no major disassembly because all working parts are readily accessible from the outside.

Investigate this "workhorse" source of dependable, low-cost power—the result of nearly four decades of experience, research and development. Write for Bulletin ES-B69, or ask for a representative to call.



With its new 4 cycle, 17" bore x 21" stroke RV-16 *Enterprise*, the Waverly installation has become known as a "showplace among the power plants of the nation."

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Editorially speaking -

Keep Your Sights High

"We can't do all the things you write about. In the field, lots of things have to be done that are not according to the 'book'. We have to get along with what we have and keep things running." This is a paraphrased portion of a recent conversation about maintenance of construction machinery. It also included talk of job pressure that made it necessary to run equipment beyond service periods, owners that write off equipment on a job and spend a minimum for maintenance, and a lot of talk about "what they got away with". Okay, so they can't (or won't) live up to the "book". Does this reflect on the validity of what's in the "book" or on our reporting of the best recommended practices? Not at all. It's like saying that the clergy should stop plugging the Ten Commandments because very few are living up to all of them. Yet to recommend anything less than full compliance is equivalent of giving license for all sorts of improper practices. Engine builders and, in fact, ourselves are in the same position as the clergymen. They can't say, "Well, you can shade this particular Commandment somewhat," any more than the engine builder can say, "It's okay to get some dirt into the engine during repairs." We wouldn't say it either. Our purpose, along with that of the manufacturer, is to keep people out of trouble. Both of us are realistic enough to know that in the field, maintenance practices fall short of the ideal. Yet to advocate anything less than the ideal would be like putting up a target without a bullseye. What do you aim at? We sympathize with the fellow on the firing line and know that he is up against both management and operational problems. When he has to "get away" with something, we have at least made him aware of the best practices and he can come as close as possible. So when we report on shops or practices that may seem Utopian, don't figure it's not for you because you can't duplicate the conditions. We'll keep putting up these targets with clearcut bullseyes for you to shoot at. The better you adjust your sights, the better will be your score.

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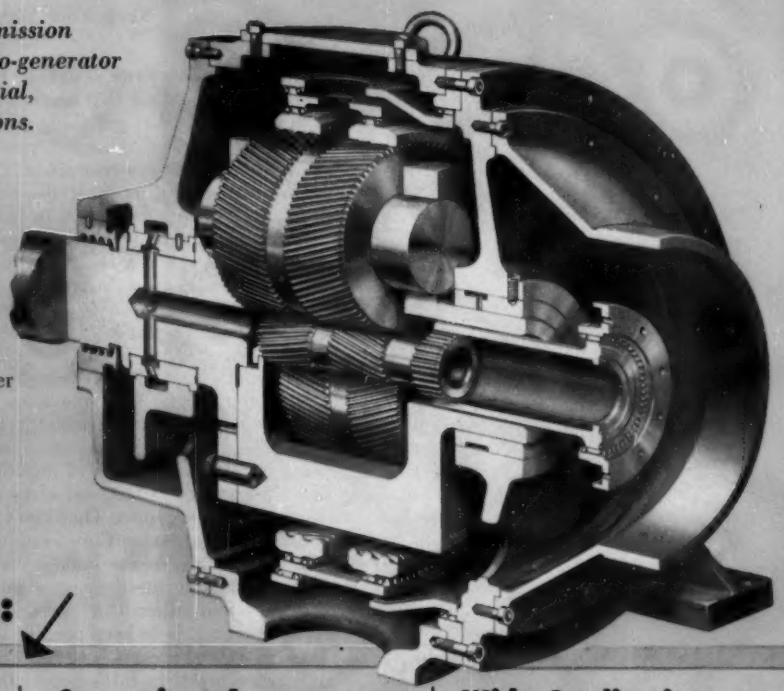
...for high speeds...high horsepower

Proved in hundreds of installations abroad totalling over 3,000,000 horsepower—now available in America!

For all high torque power transmission applications such as pump turbo-generator and compressor drives in industrial, municipal and marine installations.

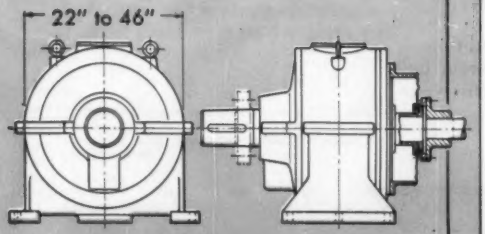
This cutaway view of the De Laval-Stoeckicht Planetary Gear shows how it provides flexibility for proper load distribution throughout the gear members. The thoroughly proved and tested design is completely reliable in transmitting high horsepower for high speed applications. • Highest efficiencies (98% or higher)...no high speed bearings...less friction losses.



Check These Advantages:

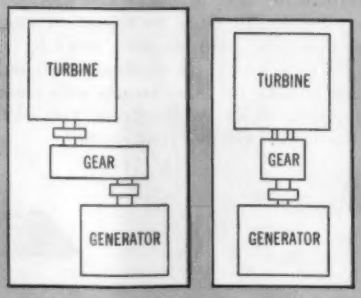
Small Size—Light Weight

Compact—low weight per hp. Sizes range from 22" to 46" in diameter, depending on horsepower requirements. Example: 5000 hp planetary unit weighs 1700 lbs. against 6000 lbs. for conventional gear.



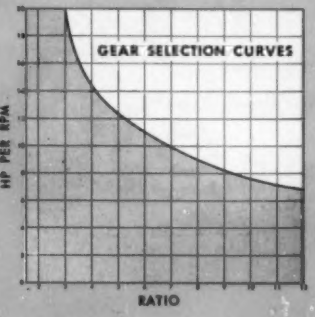
Convenient Arrangement

Co-axial or "in-line" arrangement of gear members takes up far less space than parallel axis gears of equivalent horsepower rating.



Wide Application

Capacity range shown in shaded area on chart below. For other applications, contact your De Laval Sales Engineer.



For further details, write for Bulletin 2400.

DE LAVAL *Steam Turbine Company*

Nottingham Way, Trenton 2, New Jersey

DL431

highlights

Locomotive units totaling 338 were placed in service in first 9 months of 1958 by Class 1 railroads, according to the Association of American Railroads. All were diesel-electric except three gas turbine-electric units. New locomotives on order on October 1, totaled 403, of which 376 are diesel-electric and 27 are gas turbine-electric units.

New Swedish "Scania-Vabis 75" diesel truck features a "free-bearing" body design. Reportedly the first in Europe, radiator, hood, fenders and cab are built in a single unit and mounted on the chassis at four suspension points. Presumably there is some cushioning at suspension points that should isolate the cab from chassis vibration.

Costs are up on rentals of construction equipment according to the 1958 "Compilation of Rental Rates for Construction Equipment", published by the Associated Equipment Distributors, (A.E.D.). Here are two ways to offset this boost in rental charges—(a) cut downtime and get maximum efficient performance by better maintenance and (b) schedule equipment use more carefully for maximum utilization.

Diesel power is gaining in the wheel-type tractor field according to Bureau of Census, U. S. Department of Commerce figures. Figures exclude contractors' off-highway type that are predominantly diesel anyhow. Production through August, 1958, totalling 163,465 units, breaks down as follows: gasoline—72%; diesel—23.5%; and LPG—4.5%. Figures for the same period in 1957 with a total production of 161,739 units shows; gasoline—77.9%; diesel—16.5%; and LPG—5.6% Diesel's 7% gain came 5.9% from gasoline and 1.1% from LPG.

Highway construction got the biggest single-year dollar outlay ever made at one time by the federal government. The government's share for building roads for fiscal 1960, beginning July 1, 1959, is $3.4-billion. Some $2.5-billion will go toward completing the interstate highway system to be finished by early 1970. States put up only 10% of this amount. The other $900-million will go for building primary, secondary and urban highways. States match this money on 50-50 basis.

Convenience of Aerosol spray products eliminates excuses for not doing many jobs. Today you can get rust inhibitors, tool maker's ink, lube oils, cleaners, degreasers, etc., in these pressurized cans which save time and therefore money, and do a good job.

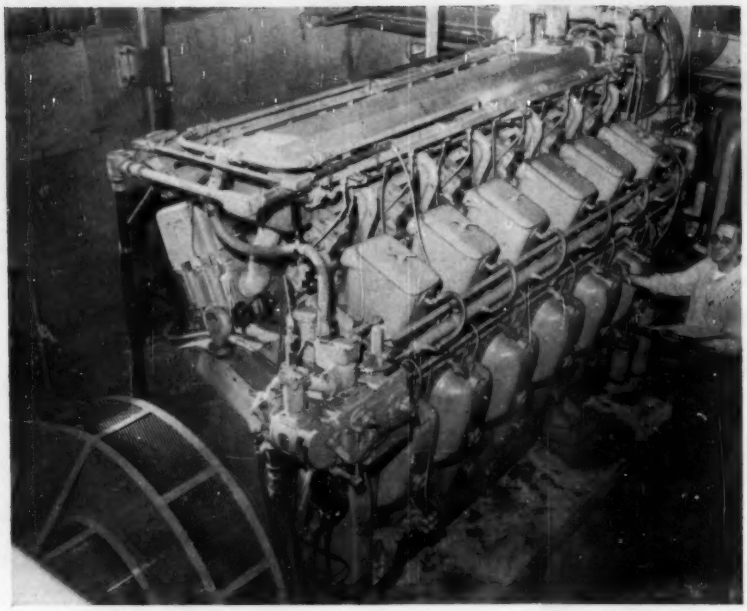
New York, New Haven & Hartford RR became the first railroad to invoke the loan-guarantee authority of the Transportation Act of 1958. ICC was asked to guarantee a proposed private loan of $16,542,300 to purchase 60 diesel-electric locomotives.

Contractors will buy more construction equipment soon, according to B. S. Oberlink, President of Allis-Chalmers Mfg. Co. He bases this opinion on two facts, (a) construction is booming and (b) contractors report that their equipment fleets are either fully at work or fully committed on work.

New gas generator produces high-caloric gas using a wide range of refuse materials as fuel. A specially interesting point is that this West German development as reported by the Armour Research Foundation will produce gas from raw lignite.

Technical obsolescence or physical obsolescence — either can knock your equipment out of the running. Whether equipment has become outdated by technological advances or inefficient through aging, it will pay to buy new equipment now. Increased cost of operating obsolescent equipment may mean you won't be low bidder on a job and lose it.

Cummins diesel sales may double to about $200-million by 1962 according to R. E. Huthsteiner, President of Cummins Engine Co., Inc. He attributes this to Cummins' growing share of the heavy-duty highway truck market. For the past six years, over 50% of these trucks registered in the U. S. have been powered by Cummins Diesels. This increased to 57% in the first half of 1958. Mr. Huthsteiner also says Cummins' research programs should make it possible within five years, to double output ratings of current models without increasing weight or size.



Paul Hutchinson, pump station operator, checks over the Alco Model 251 turbocharged, 12-cyl dual-fuel engine. Engine drives 20,000-gpm centrifugal pump (not seen) through the flexible coupling at left.

Standby Unit Gives Protection Plus

Dual-fuel pumping unit installed in steel mill to insure supply of cooling water to furnaces payed for itself in one emergency. Instead of just pumping service, its rugged efficiency resulted in additional jobs for more flexible operation at reduced cost.

"IF this engine comes through just once, it will have paid for itself." Those were the words of a top Lukens Steel Co., executive when an Alco dual-fuel engine pumping unit was installed at their Coatesville, Pa., plant two years ago. And those are the sentiments of practically all who buy dual-fuel or diesel power for emergency or standby service.

Users of such dependable standby units are seldom if ever let down. Such was the case with the turbocharged, Model 251 Alco unit which was given a vital twin role at the Lukens plant. This 12-cyl engine pumping unit is assigned the job of relieving peak electrical loads by providing crucial cooling water to the open-hearth furnaces.

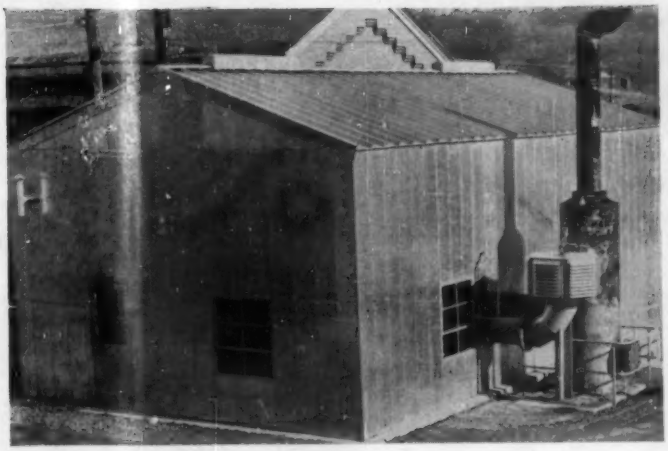
But of even more importance, the unit supplants the a-c motor-driven pumps when they require maintenance or public power fails due to electrical storms. In the latter case, the benefit is more pointed; by continuing water flow to cool furnace doors, huge sums of money are saved. The unit has already more than earned its keep. It has operated over 180 full days.

This dual-fuel engine made by Alco Products, Inc. is of the type used in many applications. Burning diesel oil exclusively during startup, it normally runs on 93% natural gas blended with 7% diesel oil.

In the Lukens application, this engine drives a close-coupled, 20,000-gpm De Laval centrifugal water pump supplied by the Dravo Corp. No intermediate speed increasers or reduction gears are required. Speed and torque characteristics of the engine and pump are matched according to Alco engineers.

The engine-driven pump is installed in an inexpensive galvanized steel building. This is adjacent to Lukens' 20-million-gallon settling reservoir located a mile from the main plant area.

Installed in the pumphouse with the engine is equipment designed to make the station fully self-sufficient. A 5-hp gasoline engine is used as standby for the electric motor driving the engine-starting air compressor. Another 10-kw gasoline engine-generator set provides all pumphouse power requirements, including electric lights. Still another engine controls the main reservoir valve.



Galvanized steel building built by Lukens Steel Co. to house Alco pumping unit. Air Maze intake filter and silencer and Fluor exhaust silencer are seen at right hand side of building.

Pumping Cycle

In pumping service, the engine handles a water cycle beginning in Brandywine Creek, a mile downstream from the plant. A pumping station on the stream bank pushes water several hundred feet into the settling reservoir.

Normally, two of three 10,000-gpm motor-driven pumps handle the cooling-water supply chore. The motors are completely dependent on the local utility for power. One is on continual standby.

With either the motor-driven or engine-driven pumps on the line, water is drawn from the reservoir and pumped a mile to the plant. Here it cools the open-hearth doors and also fills all plant requirements for process water.

The cycle is completed by dumping the water back into Brandywine Creek where it flows downstream to the reservoir again. The cycle does not reduce flow of the creek since virtually all water removed is replaced.

More Benefits With Prime-Mover Power

The engine pumping setup serves another valuable role for Lukens. By supplanting the motor-driven pumps when plant electrical consumption starts to peak, it effectively cuts overall power usage resulting in substantial annual savings in power costs. About a 1300-electrical hp load is taken over by the engine when the need arises.

Only 11 months after the engine pumping unit was placed in service, a severe electrical storm knocked out the central transformer station at the 148-year-old, 700-acre plant. Every electric light was doused. Not only would a 2000-man shift have been idled but by sudden cut off of the motor-driven pumps, the open-hearth furnaces could have been ruined or severely damaged—if the engine-driven pump had not been available immediately.

This was the safety valve in this case. Plant engineers had established a standard rule that the engine was to be running every time an electrical storm began. Since the engine was available when the transformers went out, it immediately supplied crucial water to the furnaces and avoided damage that could have run to thousands of dollars.

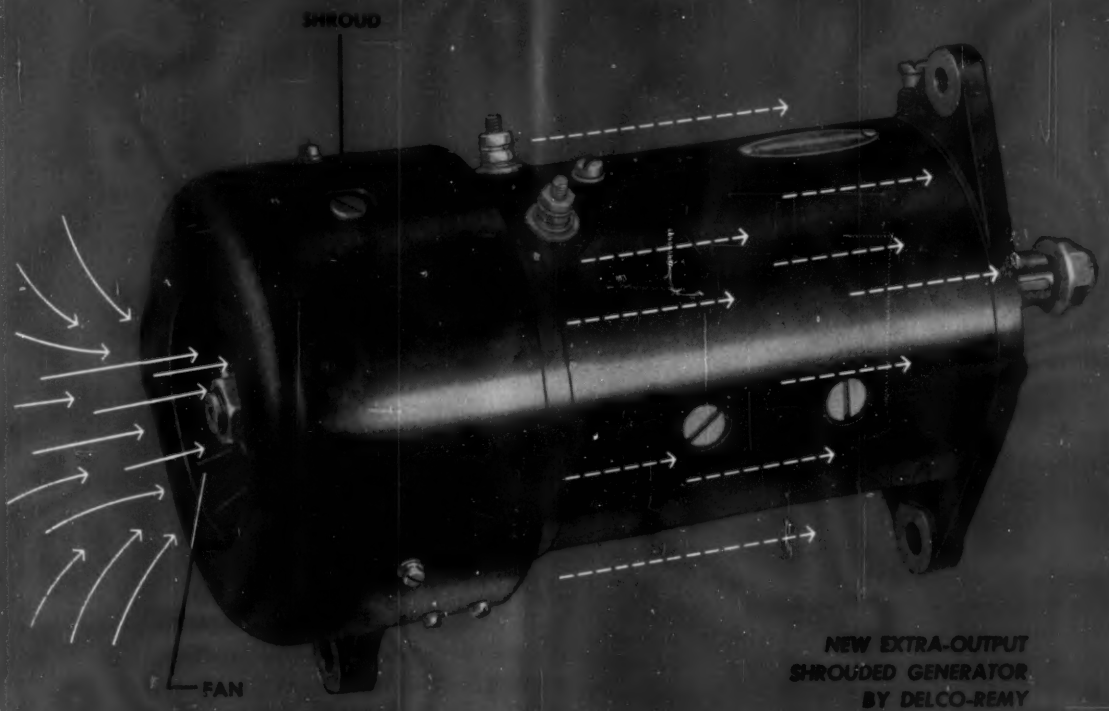
The "pluses" are still being realized from what began as a project to provide standby pumping service and peak-loading aid. And at reasonable cost too, since total cost of pumping unit, auxiliary equipment and building was under $200,000.

In mid-summer of 1957 Lukens broke ground on a $33-million expansion program. During this major expansion project, the pumping unit has been used to permit periodic shutdowns of the motor-driven pumps while electricians revamp the plant's electrical circuitry. The engine has operated on such duty for three weeks at a time—no novelty for these units built for rugged duty.

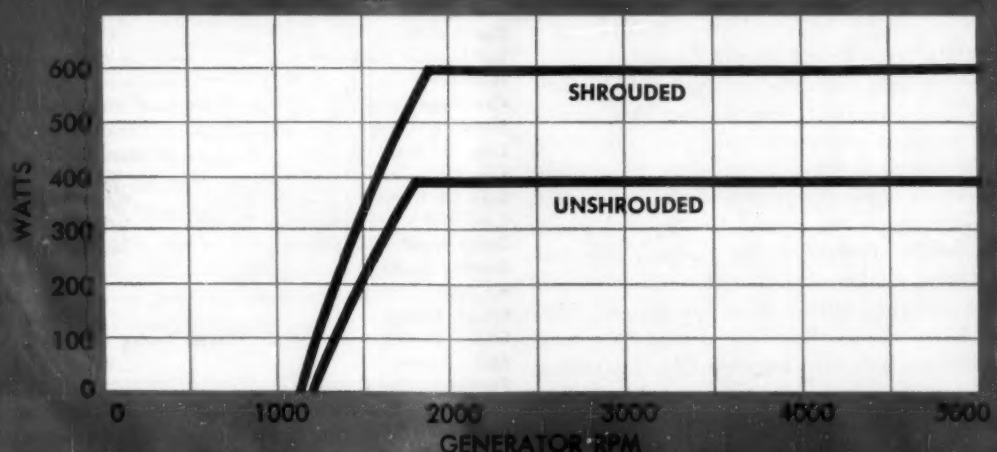
Major Equipment

Dual-Fuel Engine	Alco Products, Inc.
Fuel Injection Equipment	American Bosch Arma Corp.
Governor	Woodward Governor Co.
Centrifugal Pump	De Laval Steam Turbine Co.
Flexible Coupling	The Falk Corporation
Lube Oil Filter	Michiana Products Corp.
Lube Oil Strainer	Wm. W. Nugent & Co., Inc.
Lube Oil Cooler	Young Radiator Co.
Lube Oil & Water Temperature Controls	Amot Controls Corp.
Jacket Water Heat Exchanger	Young Radiator Co.
Air Intake Filter	Air Maze Corp.
Air Intake Silencer	Air Maze Corp.
Exhaust Silencer	The Fluor Corp.
Exhaust Gas Pyrometer	Illinois Testing Laboratories, Inc.
Alarm System	Viking Pump Co.
Starting Air Compressors	Quincy Compressor Co.
Tachometer and Drive	Weston Electrical Instrument Corp.
Gas Pressure Relief Valve	Fulton Sylphon Div., Robertshaw-Fulton Controls Co.
Gas Pressure Regulating Valve	Fisher Governor Co.
Gas Safety Control Valve	Fulton Sylphon Div., Robertshaw-Fulton Controls Co.
Gas Filter	Air Maze Corp.
Gas Shutoff Valve	Globe Union, Inc.
Diesel Fuel Tank	Philadelphia Range Boiler Co.

PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE



NEW EXTRA-OUTPUT SHROUDED GENERATOR BY DELCO-REMY



COMPARABLE OUTPUTS OF ENCLOSED GENERATORS WITH AND WITHOUT SHROUD

NEW DELCO-REMY TOTALLY ENCLOSED GENERATORS OFFER 50% MORE OUTPUT WITHOUT INCREASE IN SIZE

Delco-Remy's new, totally enclosed shrouded generators offer up to *50% more* output than former enclosed models of this size. They are especially designed for construction vehicles and off-the-road equipment subject to extremes of dust and moisture, or corrosive materials. Because they are totally enclosed, they are *splash-proof* and *dust-proof*.

Key feature of the new units is a high-efficiency fan mounted at the commutator end in a compact, formed steel shroud. The shroud-controlled air blast travels closely along the generator frame where it produces rapid and effective cooling . . . makes possible up to *50% more output*, without the added cost of increased frame size.

For every kind of heavy-duty operation, Delco-Remy generators provide greater power and reliability with long life. Be sure to specify Delco-Remy shrouded generators—where required—for your new equipment. Readily available in 6-, 12-, and 24-volt models for replacement application on present equipment through the United Motors System.

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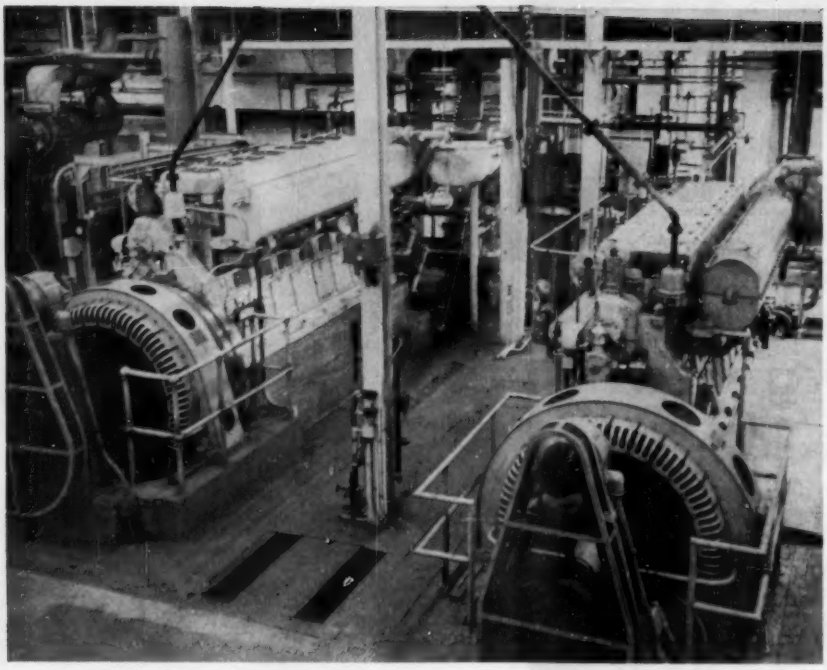
ELECTRICAL SYSTEMS



Original engine No. 1 is at left center with part of No. 3 visible. No. 2, second installed, is at right. Pipes above engines are crankcase vents angled to clear overhead crane.

PART I

Nantucket Utility Goes Automatic

By C. G. Snow
Vice President, Nantucket Gas and Electric Co.
E. R. Sauder,
Cooper-Bessemer Corporation.

Use of residual fuel cut power production costs at Nantucket Gas & Electric Company's electric generating plant. Now, installation of a control system for automatic operation provides further economies by reducing operating costs through improved efficiency. Here are details of the controls, how they function in the plant and their advantages.

Editor's Note

Nantucket's history stretches from sperm-oil lamps to kilowatts. Once the center of the whaling industry with an all-year around population of 8000, introduction of petroleum products idled its whaling ships. Now it is a summer resort with 3500 residents. Seasonal influx brings in thousands from all over the world posing severe problems for the power company. Carrying on with the resourcefulness of the hardy Nantucketers, these problems have been met and their effects minimized. This is the subject of this two-part article. The first part tells what has been done to provide dependable power at minimum cost. The second part will relate the new ideas and new equipment to operation at Nantucket.

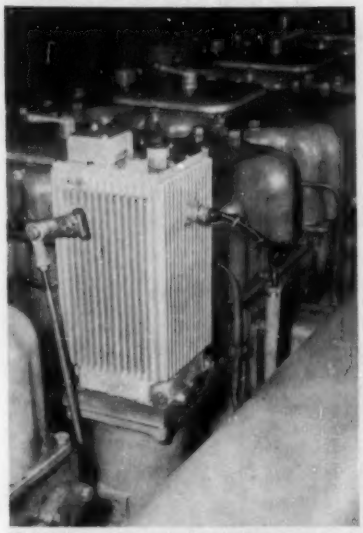
NANTUCKET Gas & Electric's automatic operation of its power plant is the big story.

Second in importance and only because it's been going on for some time is its successful use of residual fuel. Combined, they make a winning team in the fight against ever-rising costs.

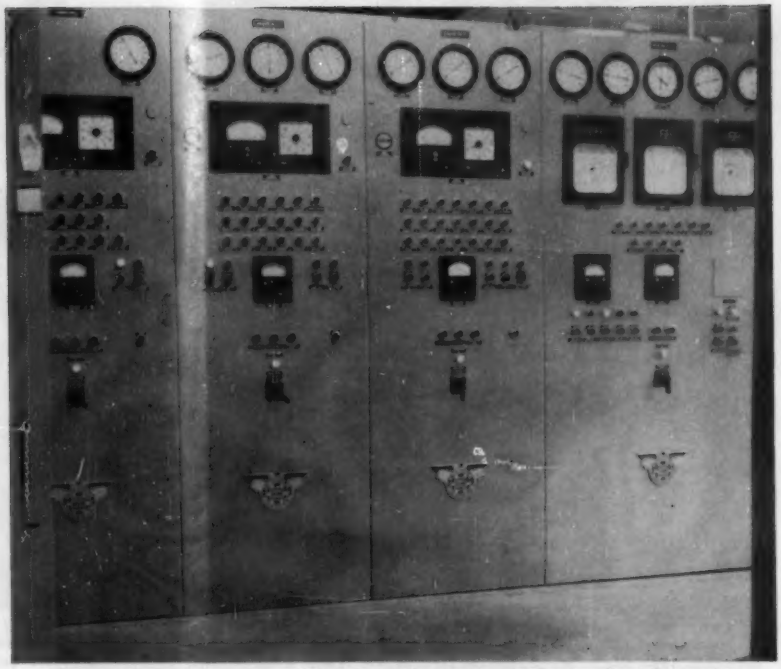
You can't measure this utility's power costs or their rates by the yardstick of other generating plants; their problems are unique. An island well off the mainland, everything carries an extra tab for transportation. A popular summer resort with no industry, seasonal load variations are murder. Therefore, comparison can only be based on what power would cost if the foresighted management had not taken advantage of every means to improve efficiency and economy.

Fortunately, Nantucket is so located that many aircraft navigational beams and communicational facilities are located there. This 24-hr, year-round load improves the plant running capacity factor. On the other hand, it imposes a requirement for strict frequency control and makes "outage" an extremely bad word.

As its name implies, the utility



Hydraulic actuator of electrical governor positions fuel racks in accordance with signals received from control unit. Control unit senses frequency (engine rpm) and on variation from normal supplies appropriate signal to the actuator for quickly correcting the engine speed.



Three engine control panels at left and station panel mounting two Sen-s-Tron units. Lube oil, turbo oil and jacket water pressure gauges are at top of engine panels. Pyrotac is below, with engine hour meter at left. Alarm lights are around meter showing turbo exhaust temperature. Control, test and power buttons are above "manual-automatic" switch.

supplies both gas and electricity, manufacturing both on the island. Boilers were required for making gas and, originally, steam generation of electricity seemed logical. Despite the fact that residue from the gas scrubbers supplied part of the heat to the boilers, diesel power generation proved more economical. Engine #1, a Cooper-Bessemer JS-8, was installed in 1948. This engine was rated 700 kw at 400 rpm. Engine #2, a second JS-8, went on the line in 1953 but this one was rated 1000-kw at 514 rpm. Engine #3 is an LS-8 rated 1250 kw at 327 rpm. This was installed in 1957.

Right from the start, heavy fuel was used. Lower cost per gallon was one factor. Also, storage tank capacity was based on handling the full load of a small tanker. This was the most economic means of delivery of a selected gas-enrichment oil used at the time in making gas. Use of another fuel would have meant investment in more tanks. So gas-enrichment oil was used as fuel.

With the added diesel consumption, the picture changed. More tanks were built and residual fuel was purchased on a competitive basis for use in the diesels. Now, this is also used in the gas-making process. Thus a lower-cost fuel, competitively purchased, is used throughout. There'll be more on fuels later.

One interesting point, before getting into the controls, concerns the engine foundations. On this sandy island, getting adequate bearing for the foundations was a problem and the high water table tended to transmit vibration like a party line spreads gossip. The solution was to build a concrete "boat" for each engine. In the boat, an inertia block is suspended on spring-type vibration dampers. The engine rests on this block. This effectively solved the dual problems of flotation and vibration.

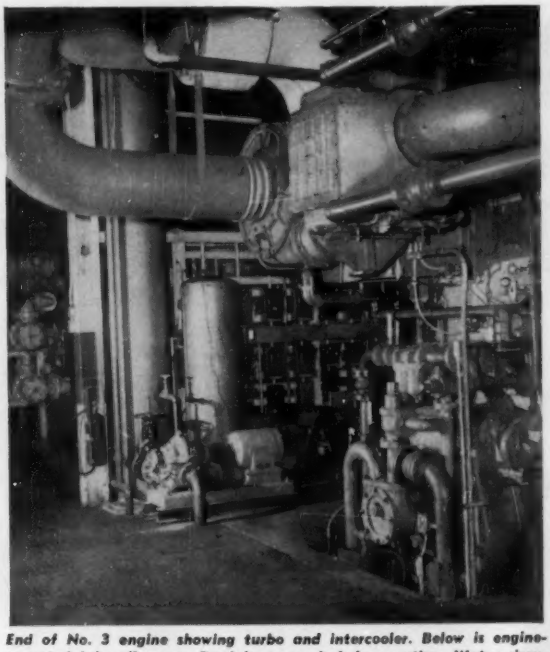
Now, Why Automation?

One man on shift may handle a 2000-kw load but you still need the same man if the load is 200 kw or 20 kw. The point is that when attendance must be continuous, regardless of kilowatts produced and billed, you have the same fixed cost. He may be busy only half the time but you can't hire half a man. Small plants in particular suffer from this high cost item.

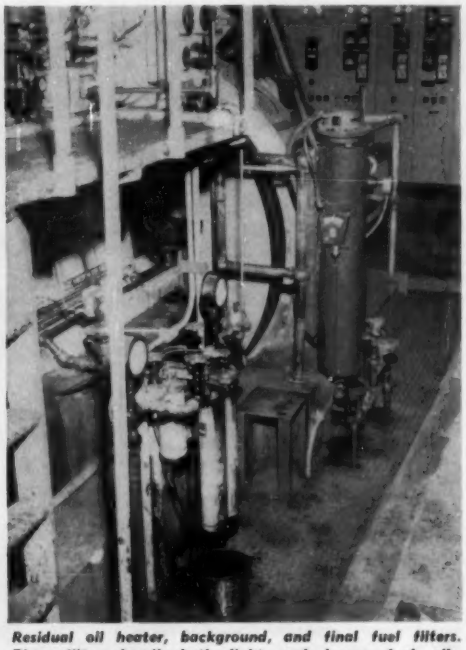
A solution lies in unattended operation. However, reliability can't be sacrificed so some means is needed to monitor operation and do the necessary jobs. This is where automatic controls come in. So their first advantage, and a big one, is reduction of operating costs. This was particularly important on Nantucket.

Attendant savings were made possible through increased plant efficiency. Take one example—total engine hours were reduced. When load is mounting on one engine and it is expected that another must be brought on the line, it's human nature to start the engine well in advance and have it ready. By contrast, the control system senses the exact pre-determined point when an additional engine is needed, starts it and brings it on the line in a short but adequate time cycle. It takes it off the line with the same efficiency when no longer needed. Records show that engine running time is appreciably reduced and fuel saved.

Automatic controls inherently improve plant reliability. In attended plants, reliance is still placed on alarm systems. Temperature and pressure-sensing instruments at key points alert the operator to irregular conditions long before he would otherwise be aware of them. Auto-



End of No. 3 engine showing turbo and intercooler. Below is engine-mounted lube oil pump. Pre-lube pump is below grating. Water circulating pump and standpipe, left background, are typical of all engines.



Residual oil heater, background, and final fuel filters. These filters handle both light and heavy fuel oils. Note gauges to show pressure differential in and out.

matic controls are simply an extension of this principle.

More instrumentation is used and a more comprehensive check is made of vital engine functions. Troubles will be sensed earlier. Suppose a trouble warrants immediate engine shutdown. Obviously, another one should be started. Which does the operator do first? Automatic controls take the problem out of his hands and does both simultaneously.

These are reasons given (they apply anywhere, in any size plant) for investment in automatic controls at the Nantucket plant. It is felt that cost of the installation will rapidly be paid off out of savings. After that, savings will enable Nantucket Gas & Electric to hold the rate line despite rising costs and even make a dollar.

What Controls?

Cooper-Bessemer's En-Tronic control system was installed in the plant. It breaks down into two general groups, (a) controls associated with each engine and (b) controls common to all engines. A brief description of each will also indicate the scope of the control setup.

Each engine has a floor-mounted control panel. This is the "nerve center" that properly sequences starting and stopping with the ultimate in safety to the equipment. It also acts on indication from all the pressure and temperature sensing devices on the engine. Some of these sensing devices monitor engine operation; others are for engine protection.

Extent of instrumentation is shown in the list of points monitored:

Generator outboard bearings temperature

Lube oil pressure and temperature

Jacket water pressure and temperature

Turbocharger lube oil temperature

Engine overspeed

Excessive vibration

These items are also arranged for engine shutdown. A dual sensing range is provided. For example, jacket water temperature might be arranged to give alarm at 190°F and shutdown at 200°F. Here are the other points monitored that provide only alarm:

Pressure differential across lube oil strainer

Pressure differential across lube oil filter

Lube oil sump level

Heavy fuel oil temperature.

Pressure differential across engine fuel filter (handles both light and heavy fuel)

Manifold air temperature

Exhaust temperatures

Exhaust temperatures are continually being monitored by a Pyrotac that switches from cylinder to cylinder in succession. Here, as with all alarms and shutdowns, the desired critical temperatures and pressures can be pre-set to suit the application. A Vibroswitch mounted on the engine is sensitive to excessive amplitude of vibration. Turbocharger exhaust temperatures are also monitored and are tied in with the alarm system.

Next are three control panels common to all engines. The master control panel contains controls needed for signalling, starting and stopping the engines in accordance with load requirements. In this engine panel are controls for auxiliaries such as the jacket water circulating pump, pre-lube pump and for the air starting system. But these controls must be told when to start and stop engines. This is done by the heart of the system, the En-Tronic Sen-s-Tron unit.

This Sen-s-Tron unit was developed by Cooper-Bessemer. It measures total electrical load requirements, considering all three phases, and through circuitry, triggers the action needed to start or stop auto-

matically engines to meet the requirement most efficiently.

The station control panel contains the automatic synchronizing, speed-matching equipment common to all engines.

Great flexibility is provided by the control setup. First, individual engine operation can be manual (still retaining the alarm and protective features) or automatic. Just turn a switch on the engine's control panel. This permits an engine to be taken away from station control for maintenance or for any other reason.

All engines set on "Automatic" are under station Sen-s-Tron control. The preferred order of operation is selected by a sequence selector switch with any one engine set as the lead unit. This one will always be on the line and others in the selected order will be started and stopped as needed.

Dead Buss Starting

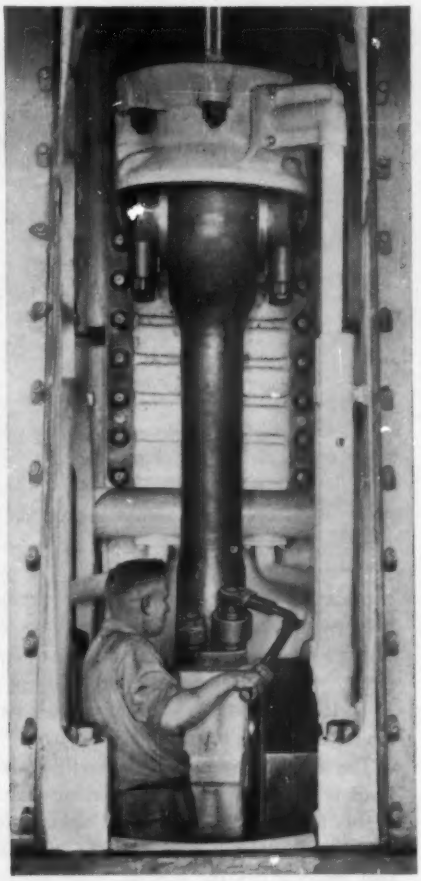
One major feature is that the system will operate or start from a dead buss. This feature is believed to be unique in the control field. This is important for any unattended plant but is particularly so at Nantucket with its job of powering vital aircraft beams, etc.

This feature involves an additional use of the Sen-s-Tron and added circuitry. Assume that one engine is carrying the load and for some reason a shutdown occurs. The busses are dead. In most automatic installations, someone must start another engine. Time is involved in getting an engine back on the line.

At Nantucket, control circuits, now powered by station batteries, start another engine and have it on the line within 90 seconds. But it's not as simple as that. When busses go dead, a load "accumulates". You have to figure on the starting surge of motors and other equipment. Slap all this on the just-started engine and you may stall it.

So the Sen-s-Tron principle was put to work again, this time measuring circuit loads and closing circuit breakers on a priority system. As soon as the engine is ready for load, the distribution circuit feeding the hospital (first priority) is cut in then aircraft beams. Other circuits are then connected as the engine can pick up the load.

Snap-on tools are used in the assembly of world-famous Nordberg diesel engines. Pictured is a large *Snap-on* ratchet and socket wrench tightening a connecting rod bolt. Cylinders in this giant have a 29-in. bore, 42-in. stroke. Note specially curved handle which permits swinging tool within engine framework.



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American Bosch Introduces The "PSH"

Smaller, lighter, simpler than the popular Model PSB yet retaining its quality and performance.

"PSH" is the latest word from American Bosch. It's a new distributor-type pump, generally similar to their type PSB. With nearly 200,000 PSB's in service, why the new pump? Simply that it is the latest development of a continuing research program aimed at satisfying customer needs.

Customer requests have been for lower-cost injection equipment—both originally and for repairs. Greater compactness and reduced weight are always welcome features. The PSH goes a long way in satisfying these requirements while retaining all performance features of the PSB. It is built to the same precision standards of other American Bosch injection equipment.

The PSH consists of an easily-replacable hydraulic head assembly, a variable-speed mechanical governor, a supply pump and an aluminum housing for these plus the drive mechanism. Like the PSB, it has a single plunger that reciprocates for high-pressure pumping and rotates for distribution of fuel to cylinders in their firing order.

Reduction in size and costs is attributed to (a) an improved system of filling the high-pressure pumping space, (b) simplification to eliminate parts and (c) design of remaining parts for greater ease of manufacture.

The annular-fill design will be covered later but its effect on size was to allow cutting the plunger stroke from 6 mm (for the PSB) to 3.5 mm. This reduces size and amount of material in the head. Cam lift is less and thus related parts are shorter.

Method of plunger drive was simplified, eliminating many parts. A new governor was designed. Arranged to run at engine speed, it could be smaller and more compact. A simplified fuel supply pump was also incorporated as part of the unit.

Result is that the PSH is 3½-in. shorter and extends 1-11/16-in. less above the drive shaft center than the PSB. Weight is almost halved—10¾ lb against 20 lb. There are fewer parts and these have been designed for lower-cost production, lowering repair costs. All adjustments—idle, full-load, torque backup and maximum speed —are externally accessible.

Construction and Operation

Housing and Drive Mechanism—The housing is an aluminum casting. Three available types differ only in arrangement for mounting. One has a duplicate of the PSB mounting flange and thus provides for pump interchangability. The second flange is the SAE No. 5 with 3-hole mounting used with half engine-speed drives for direct interchangability with APE type pumps. The third is the SAE No. 6, 1.625-in. dia. distributor mount for half-speed drive in the manner of ignition distributors.

This one housing (with mounting options) is used for all 4- and 6-cyl pump versions, permitting the use of engine or half-engine speed drive with all mounting flanges.

A hardened-steel camshaft (8) turns in bronze bushings having thrust faces. Cams are symmetrical, permitting either clockwise or counter-clockwise pump rotation. When driven at engine speed, cams have two lobes for a 4-cyl engine, three for a 6-cyl engine. For half-speed drive, the number of lobes is doubled in each case. At the drive end, a standard 20-mm taper is used with 17-mm taper optional.

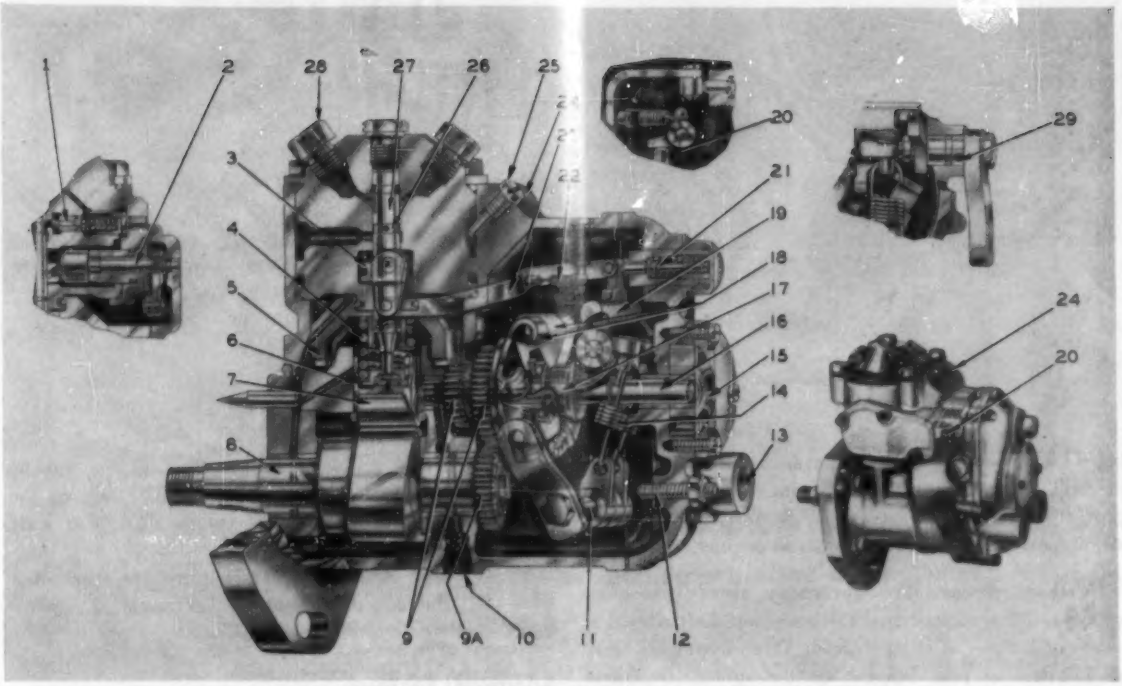
The governor shaft (16) is gear-driven from the camshaft so as to always turn at engine speed. The gear ratio will depend on whether the drive is full or half engine speed. The governor drive gear (9) is two gears in one, one section being used to drive the plunger drive gear (5). All gears are match-marked.

Three jobs are done by the governor shaft—(a) plunger rotation for distribution, (b) governor rotation and (c) supply pump drive.

Camshaft bushings, gear-end governor shaft bushing, tappet assembly, plunger drive gear and plunger base are all pressure lubricated. Oil is piped from the engine's oil gallery to the inlet (10). Other parts depend on splash lubrication. Oil drains back to the engine through holes in the mounting flange. The plunger and supply pump, of course, are fuel-lubricated.

Fuel Supply System—The supply pump (15) has a flexible vane-type impeller. Inlet and outlet ports are symmetrical and this type impeller permits rotation in either direction. Vane flexibility also permits priming right through the pump without any bypass valves. Inspection and replacement of the impeller involves only removal of the cover plate.

There are two fuel inlets (13) connecting to the supply pump. Inlet and outlet lines are appropriately connected, considering the direction of pump rotation. The outlet line goes to a final fuel filter. The outlet line from the



Nomenclature and function of each numbered part are given in the text.

filter goes to either one of two identical inlet connections (24) supplying the hydraulic head. The head outlet line goes back to the tank.

System pressure, about 15 psi, is maintained by a spring-loaded overflow valve. Its location is flexible but it is ordinarily placed in the fuel return line.

Hydraulic Head Assembly—The assembly fits a counter-bore in the top of the housing, is positioned by a dowel screw (25), is sealed by an O-ring and retained by four bolts. The head assembly can be removed without disturbing the driveshaft, governor or even the fuel supply lines. The head is a nitrided steel cylinder. Circumferential grooves, connected to the fuel inlet, provide a fuel sump. Radial ducts connect this sump with an annular groove in the central bore.

Plunger (27) is individually lapped to the head's central bore. A fuel metering sleeve (3) is a lapped fit on the plunger and is free to be moved up and down in a recess in the head by the bell-crank assembly (2). Lower part of the plunger is arranged to mount the plunger drive gear (pin drive) and the upper return-spring seat. It then extends downward to bear on a button with a cupped seat that in turn bears on the tappet shell (6). This design compensates for any plunger-to-tappet misalignment.

The lower spring seat performs two functions—(a) provides a seat for return spring (4) and (b) holds the tappet assembly and plunger as a unit. With the upper seat fixed, spring force holds the tappet roller (7) in contact with the cam. Tappet assembly and plunger thus reciprocate in accordance with cam contour.

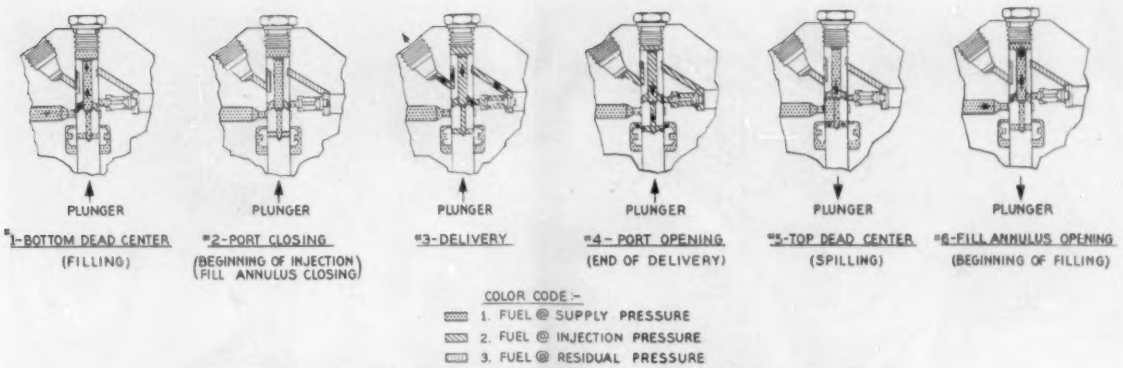
A single delivery valve (1) is incorporated in the head. Also, all necessary ducting for fuel flow right to the discharge outlets (28) is included.

Pumping, Distribution, Metering—Fast filling of the pumping cavity is highly desirable, particularly at high engine rpm. Referring to the operational diagram, filling begins as soon as the plunger's fill groove (26) opens into the supply annulus (#6). It continues (#1) until the fill groove is above the annulus (#2). Injection starts immediately.

As plunger stroke continues, trapped oil can only flow back through the fill groove to the delivery valve. As pressure develops, the valve is unseated and fuel flows through a duct to the distribution annulus and slot in the plunger. This slot will be in index with the passage to the appropriate discharge outlet. By the next pumping stroke the vertical slot has rotated to index with the next discharge outlet, and so on, through the full firing order.

In one pumping sequence, injection continues until the lower spillport in the plunger is uncovered (#4) at the plunger sleeve. This spills the high pressure (#5), delivery stops and the delivery valve seats, at the same time relieving line pressure through action of a retraction piston. Effective pumping stroke is thus controlled by location of the plunger sleeve. Maximum delivery occurs with the sleeve in top position and no fuel is delivered in its lowest position.

No provision is made for change of injection timing at the higher engine rpm's. Actually, requirement for automatic timing has been lessened by reducing injection



Operating sequence of PSH pump including filling, pumping, distribution and metering.

lag. This was done by holding parasitic volume of fuel on the high-pressure side to a minimum. "Reduced volume" provides maximum injection performance and is especially important in open chamber-type engines.

Governor Action—The governor's speed-sensing assembly (18) is mounted on the governor shaft which, as mentioned, turns at engine speed. Three flyweights pivot on full-floating pins bearing on the spider. Design is such as to position the pins accurately yet hold friction to a minimum. This improves sensitivity. Flyweight movement is transmitted through a needle thrust bearing to the shaft-mounted governor sleeve (17). This sleeve moves the fulcrum lever (19) which through link rod (23) and a bell-crank mechanism (2) positions the fuel control sleeve (3).

A throttle-operating assembly (11) controls engine speed and load above idle position. Governor springs (14) are connected from the fulcrum lever to the operating shaft's spring levers. Thus, spring force opposes the centrifugal force of the flyweights. The full speed screw (12) is adjusted to limit travel of the operating lever and hence maximum engine speed.

Large holes in the spring levers are provided to leave the springs slack when the operating lever is in idle position. Flyweight force is then opposed only by the idle spring (22). Spring tension for proper idle speed is set by adjusting screw (20).

A torque backup "capsule" (21) provides for a fuel increase with a drop in speed. Essentially, this is a resilient stop. Under normal engine operating conditions, flyweight centrifugal force will balance spring force and a normal fuel quantity is delivered.

Should load pull the speed below normal, centrifugal force no longer balances spring force. Excess spring force now acts through the fulcrum lever against the torque control pin. Starting point of torque backup is controlled by adjustment of the spring preload. Rate is controlled by the spring rate and maximum fuel increase is limited by the adjustable stop screw.

Overall design of the governor is such that it is highly responsive to load requirements rather than just to speed. Combined action of the governor springs and the torque control spring provides additional fuel up the preset maximum for additional torque through a wide range of operating speeds.

Positive fuel shut off is obtained by operation of a lever (29) that acts directly on the fulcrum lever to move the control sleeve to the no-fuel position.

Additional Features

A high degree of applicational flexibility has been shown. However, designers must work with some limitations in mind. For example, present limitation on pump speed is based on a 3000-rpm engine crankshaft speed or 10,000 pump injection strokes per minute, whichever is lesser, for full-load speed.

Today's permissible injection pressure is limited to 7000 psi measured at the pump-end of the discharge tubing. Why? Loads on tappets and cams must be considered if long life is to be assured.

As to delivery quantity, the PSH will handle engines requiring up to 100 cu mm per injection stroke per cylinder at full load speed. The basic pump is made with two plunger diameters, 8.0 and 10.0 mm, and two effective cam lifts, 2.0 and 1.6 mm. In different combination they provide the equivalent of 7.0, 8.0, 9.0 and 10.0-mm plungers of the PSB. Also, by selection of plunger diameter and cam lift the PSH can tailer fuel quantity and injection duration to the requirements of a specific engine.

Being engine-oil lubricated, the pump will handle various types of fuel—Nos. 1-D and 2-D, gasoline, kerosene, JP-3 and JP-4—making it suitable for multi-fuel engines. Uniformity of delivery quantity will be maintained regardless of fuel viscosity since with a single plunger, any effects of plunger leakage will apply to all cylinders.

Finally, in the "Things-to-Come" department, the pump will also be developed for V-8 and V-12 engines using twin heads arranged in a staggered vee construction. Again, a single housing will be used with internal changes permitting it to fuel even-firing or odd-firing sequence engines.

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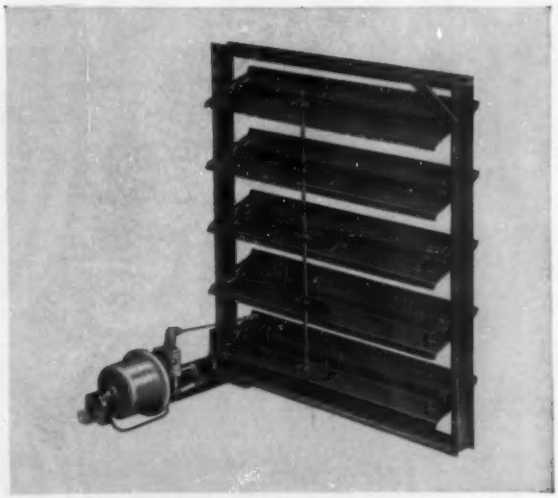

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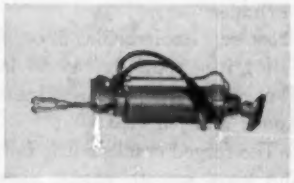
PNEUMATIC MOTORS

Grad-U-Motor shutter motor. Three sizes, for operating up to 48 sq. ft. of shutter area.



Heavy-duty, piston type ***Grad-U-Motor.*** For operating up to 96 sq. ft. of shutter area.

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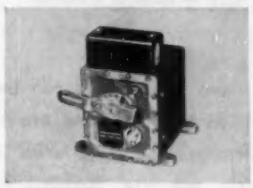

Modutrol motor operates up to 70 sq. ft. of shutter area.

Actionator operates up to 100 sq. ft. of shutter area.

Series 831E Industrial Motor operates up to 370 sq. ft. of shutter area.

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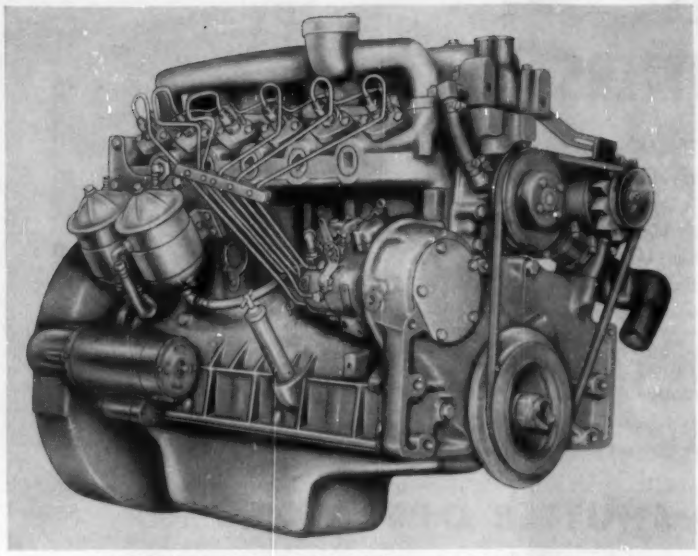
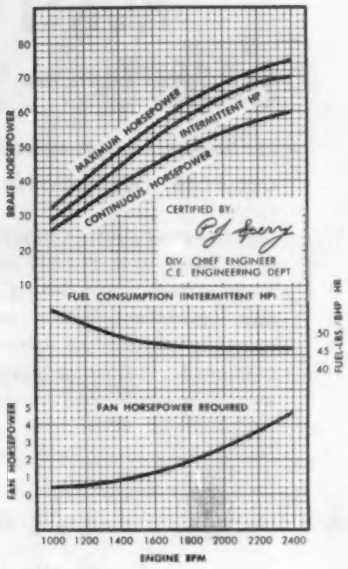




Identical in appearance, varying only in power output due to stroke difference, the UD-236 and UD-282 have many common components.

New IH Engines Now In Production

Major components are common to both diesel models as well as two gasoline models. Result — higher production runs and interchangeability with all its advantages.

TWO completely new International 6-cyl, direct-start power units are now in regular production. These smooth-running new diesels called the UD-236 and UD-282, in accordance with their piston displacement, pack high horsepower in a compact package. Both engines have the same bore, however, the UD-282 has a longer stroke than the UD-236.

These new diesels are interchangeable in dimensions and power with two new IH gasoline engines, the UC-221 and UC-263. There are many interchangeable parts among all four units.

Principal differences between the diesel and gasoline models lies in the head, pistons and the use of fuel injection as opposed to carburetion and ignition. Common use of major components favorably influences costs. Use of a 1/8-in. larger bore in the diesels permits the same horsepower to be developed at a lower bmep.

UD-236 and UD-282 Diesel Engine Features

To get a better understanding of the construction and arrangement of parts and systems on the diesel models, let us detail the major features of these units. These features include:

Reinforced Cylinder Block: The deep cylinder block, internally ribbed for extra strength and rigidity, extends down below the center of the crankshaft. This heavy ribbing plus thick webs for each of four main bearings eliminate cylinder distortion and provide rigid mounting for the crankshaft. Large water jackets permit coolant to circulate freely around cylinder walls.

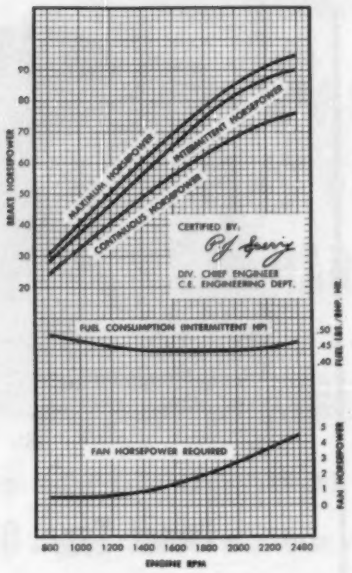
Replaceable Cylinder Sleeves: Replaceable dry-type sleeves are of fine grain alloy iron specially cast to increase wear resistance. They are hardened to Brinnell 217-277 and extensively honed and polished.

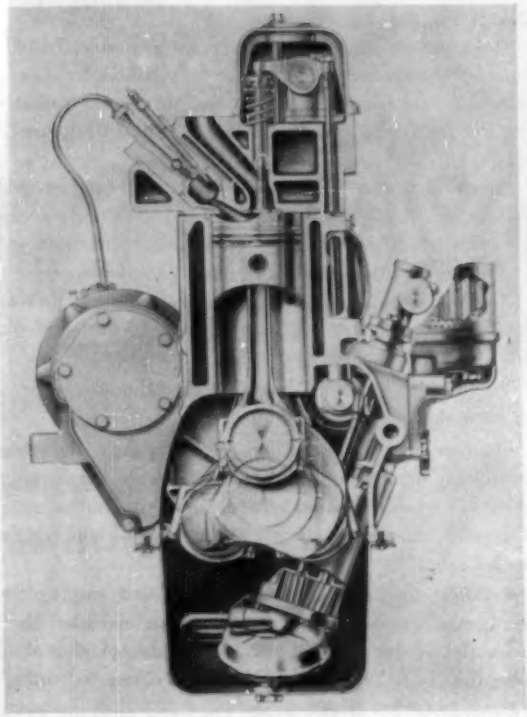
Heavy-Duty Crankshaft: The forged crankshaft is fully hardened. Counterbalancing gives smooth engine operation and eases load on the copper-lead main and conrod bearings. Spring-loaded seals at the ends of the crankshaft prevent oil loss.

Low-Friction Pistons: Aluminum alloy dished-top pistons are designed to conduct heat effectively to jacket coolant. Cylinder components and especially the combustion chamber are designed to give uniform combustion and temperature conditions. This makes for good fuel economy.

Piston Rings: Two compression and one oil control rings are used. A chrome-plated top ring is keystone-shaped. It is designed to give long life without sticking. The second compression ring is wider than the top one. A spring-loaded oil-control ring of the latest design gives

Curves for UD-236 at left and curves for UD-282 (right) show maximum, intermittent and continuous horsepower for each. Fuel consumption for intermittent hp is also given as well as fan horsepower required.





Combustion chamber design for both diesel models is the same. Glow plug is above nozzle in precombustion chamber. Dished-top piston has two compression and one oil control ring. Cylinder sleeves are replaceable. Gear-driven lube oil pump is in sump.

efficient lubrication resulting in longer sleeve and ring life with minimum oil consumption.

Exhaust And Intake Valves: Exhaust valves are made of high-quality chrome-nickel alloy, resistant to warping and cracking. Carbon buildup on exhaust valves is prevented by use of positive valve rotators. Silichrome XB intake valves are used.

Combustion Chamber Design: The time-proven IH precombustion chamber creates a high turbulence which tends to give complete mixing and burning of fuel regardless of load or speed. This permits use of a low-pressure injection nozzle of open-type design. It also permits use of lower-cost, high-heat content No. 2 fuel oil.

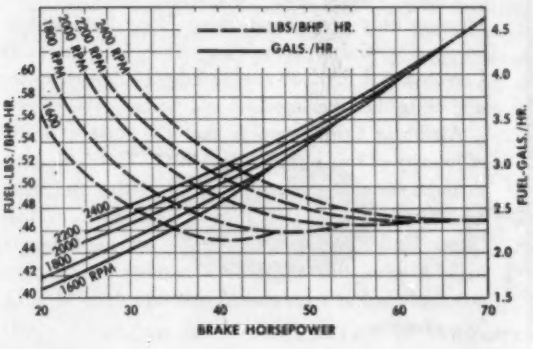
Simplified Fuel Pump: The Roosa-Master, distributor-type fuel pump used is very compact. It weighs only 9 lbs. Its low-pressure metering design reduces wear and subsequent leaks. It incorporates a simple mechanical flyweight-type governor with good governing characteristics.

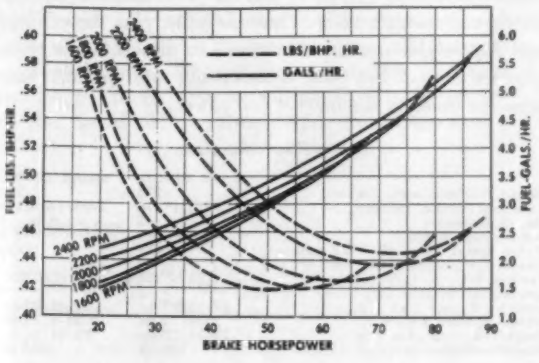
Injection Nozzle: Spring-loaded differential-pressure type single-orifice nozzles are used. Discharge of fuel through a comparatively large hole tends to prevent carbon from forming and changing the spray pattern.

Lubrication: Pressure lubrication through full-flow filters and rifle-drilled passages provides lubrication even under adverse conditions. A built-in oil cooler controls oil temperature during engine warm-up and under heavy operating loads.

Electric Starting: Individual glow plugs in each precombustion chamber quickly warm the chamber when starting and give easy starts at low temperatures. A 12-v starting system then gives a quick sure start. Delco Remy starter, generator and voltage regulator are used.

Curves for UD-236 (left) and UD-282 (right) show fuel consumption at various engine speeds.





Diesel Engine Accessories

Many power unit combinations are available. Installation for various applications are simplified by use of matched components including base, air cleaner, radiator, etc. For industrial application the following equipment is available.

Base Equipment: A heavy-duty foot-type base has welded steel front and rear supports for rigidity. A welded structural steel base for maintaining alignment of extended shaft and outboard bearing is also available.

Air Cleaner: A heavy-duty oil-bath air cleaner protects the engine from dust and dirt. For severe dust and dirt conditions, an air pre-cleaner is available.

An Exhaust Muffler reduces the objectionable noise of an open exhaust.

Radiator and Connections: A heavy-duty industrial fin-and-flat tube core-type radiator is used. A manually-operated variable-position vertical-cone type shutter maintains proper engine temperature. A fan guard encloses the fan for safety.

A Power Take-Off includes an enclosed single-plate, over-center, driving-ring type clutch. An extended shaft and outboard bearing can also be included. A stub shaft bolts directly to the flywheel for direct connected units.

Enclosures: A radiator grille, hood and dash are available for foul weather protection. Hood side doors are used for complete enclosure.

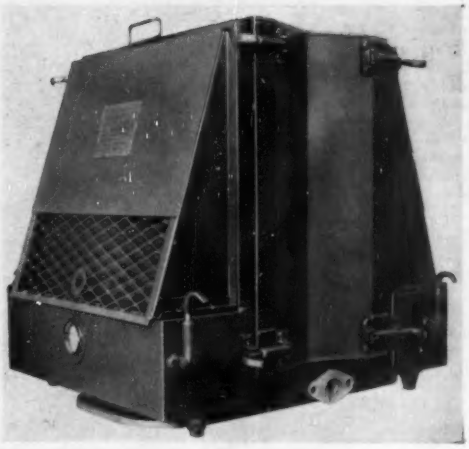
Instruments And Controls: A rear-mounted panel includes ammeter, oil pressure and water temperature gauges and starter switch. An automatic safety shut-off stops engine in case oil pressure drops or coolant temperature becomes too high. A tachometer and service meter records engine operating hours and indicates rpm. A push-pull type governor control for controlling engine speed is also available.

Conclusion

The fact that major engine components are common to the two diesel models and between diesel and their gasoline model counterparts is a big asset. Production costs are lowered and passed on to the customer. Repair, where a number of different models are involved, is simplified and training of technicians is facilitated. The interchangeability factor reduces inventories of both customer and manufacturer. These benefits, plus the efficient and dependable operation common to diesels, make these engines a good bet both economically and performance wise for those in the market for power.

General Specifications

	Model UD-236	Model UD-282
Piston Displacement, (cu in.)	236	282
Bore and Stroke, (inches)	3-11/16x3-11/16	3-11/16x4.390
No. of Cylinders	6	6
Compression Ratio	17.5:1	18:1
Piston Speed (fpm) @ 2400 rpm	1475	1756
Flywheel Housing, S.A.E. No.	3	3
Cooling System, (qt) (w/rad.)	20	20.5
Lubrication System, (qt)	9	9
Length—Engine Less Fan	39-15/32-in.	39-15/32-in.
Width—Engine Less Fan	21-9/32-in.	21-9/32-in.
Height—Engine Less Fan	29-29/32-in.	29-29/32-in.
Weight—Engine Less Fan	905 lb	905 lb



Panel-Type Oil-Bath Air Filter For Locomotives

AIR-Maze's "Panelbath", a new panel-type filter, was developed specifically for railroad use. It is adaptable to existing vertical panel adapters on locomotive diesels. Installation simply involves addition of four holding clamps.

In operation, intake air is drawn through the front grill and divided into two flows. One flow is directed to filter media. The other is directed through an oil control trough, picks up oil droplets and carries them to the media thus creating a wetting action. As oil drains from media, it carries impinged dirt particles to a sump at the bottom. Oil then returns to reservoir where circulation cycle is repeated.

Intake air entering the "Panelbath" deflects a calibrated baffle. At engine idle speeds, baffle is closed. This insures that required air is deflected through the oil control trough.

A self-cleaning filter action minimizes dirt loading on panel face maintaining a low pressure drop and assuring adequate air for combustion.

Under normal dust conditions, filter servicing involves only periodic checking of oil level and occasional draining and filling of a 5-qt reservoir. Conventional SAE 40 engine lube oil is used to wet and clean the filter media.

Air-Maze Corp. reports that the dust arresting efficiency of this unit is about 90%. This is possible through use of the principles of oil wetting and cleaning of media used on present Air-Maze oil-bath filters. Under operating conditions varying from 400 to 1700 cfm, this high dirt-removing efficiency is accomplished at a maximum pressure drop of about 5-in of water.

NOW!
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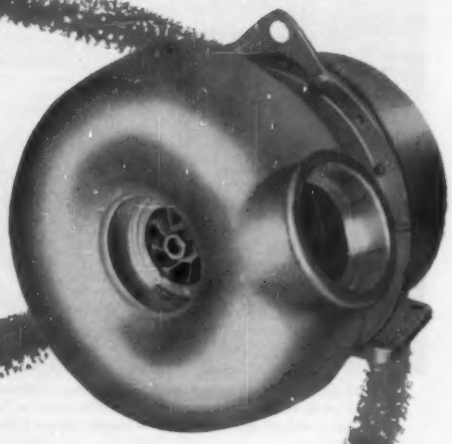
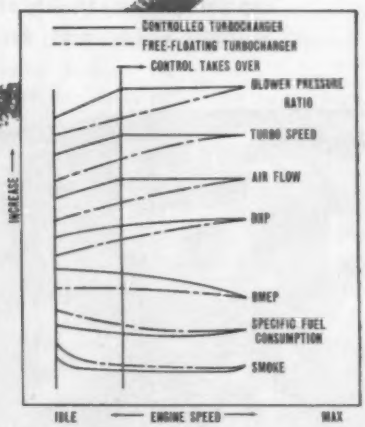


AiResearch control system keeps turbocharger output at ideal level



Improved performance characteristics of a typical turbocharged diesel engine equipped with the new AiResearch Turbocharger Control System.

Accurate control of turbocharger speed over its complete range regardless of changing load characteristics has been achieved with the new AiResearch Turbocharger Control System. This automatic control system delivers more air to the engine when needed and greatly increases torque rise, giving turbocharged diesel engines greater lugging ability when operating under heavy loads. By contrast, free-floating turbochargers operate at reduced RPM when the engine is working at below-maximum engine speed.

This improved air delivery system greatly increases the acceleration, for example, of turbocharged diesel trucks up steep grades. In a typical case, the round-trip time of a trucking company operating between Phoenix and Denver was cut from 48 hours to 42 hours. Over short hauls an off-the-road truck cut its 27-minute round-trip time to 18 minutes. Comparable gains are made for all types of turbocharged diesel equipment, stationary or mobile.

The two components of the new control system are a pressure ratio sensor and an exhaust by-pass valve. They control the speed of exhaust-driven turbochargers by modulating the amount of engine exhaust used. This eliminates overspeeding of the turboblower, and at the same time provides higher turboblower speed while lugging. Smoking is virtually eliminated under all conditions.

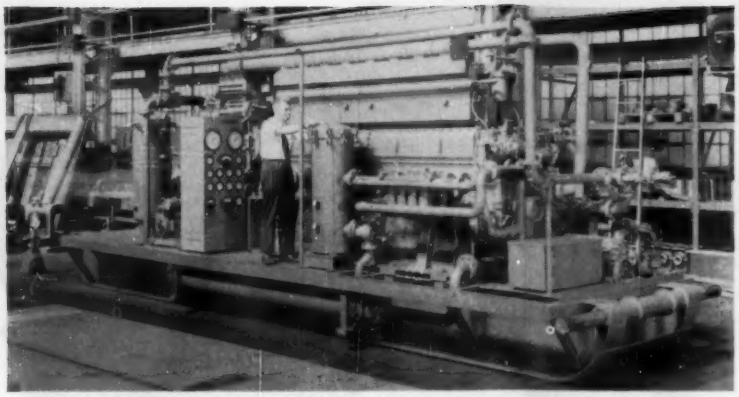
Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

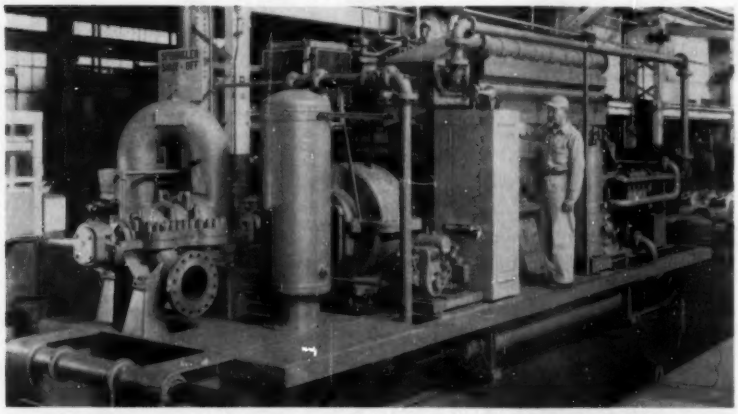
DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS



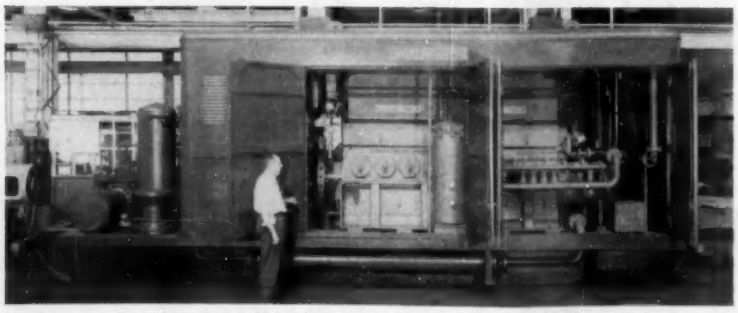
Right side of Worthington diesel. Seen are: control panel; Cuno lube filter and strainers; Fulton-Sylphon thermo bypass valve, next to lube oil filter; Nugent fuel filters at top right end of engine; Berry hydraulic pump behind tool box at right end of engine.

Pumping "Package" Is Versatile

Self-contained, self-sufficient, skid-mounted pumping unit gives flexibility of service necessary for both military needs and for industrial applications.



Byron-Jackson 2-stage centrifugal pump is at left end of skid driven through Worthington speed increaser. Starting air tank is at left of speed increaser, air compressor is next to control panel. Air Maze intake air filter silencer is above air tank. Young Radiator aftercooler is at right of air filter silencer. Ross lube oil cooler is mounted under skid just below control panel.



Hood covers all equipment on the skid except air tank and centrifugal pump. Wide doors on all sides of the foul-weather hood make all equipment on the skid easily accessible.

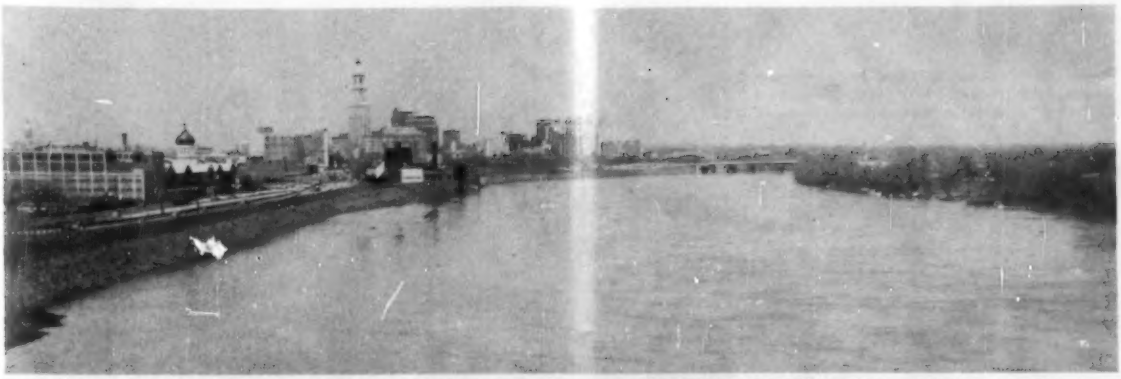
THE packaged concept has been extended to pumping units. A packaged, self-contained, self-sufficient, turn-key diesel pumping unit is now available from the Worthington Corp. This skid-mounted unit is designed for continuous pipeline or other pumping services, around the corner, across the street or in remote areas.

Typical of these units is the one recently shipped to the Corps of Engineers at Fort Belvoir. See the photos.

The diesel is Worthington's 1060-hp, 900-rpm, supercharged, 8-cyl, Model SW-9 engine. This high-output engine drives a 300-gpm, 1100-tdh centrifugal pump at 3550-rpm through a speed-increasing gear, both also made by Worthington. The engine is conservatively rated to develop specified output up to an ambient temperaure of 125°F at sea level. It will also do this at an ambient temperature of 107°F at an altitude of 5000 ft above sea level.

Mounted on the skid with the engine and pump are all the accessories needed to make this a self-contained self-sufficient unit. Only a 2-section radiator for cooling jacket water, intake air intercooler and lube oil cooler is mounted on separate skids. The fan motors for the radiator are driven by a hydraulic pump. These motors are connected through reinforced hose to a Berry hydraulic pump vee-belt driven from a shaft extension on the forward end of the SW-9.

The Byron-Jackson, Model DVSS, 10 x 10 x 14, 2-stage, engine-driven centrifugal pump is designed to handle a variety of liquids including jet fuels, aviation gasoline, diesel fuel or water. This flexibility of service makes it very suitable for military needs that may vary from one day to the next. This flexibility is also desirable for many industrial pumping applications.



One of two flood control stations guarding Hartford, Conn., is seen at left center next to dike. Dike protects low lands behind it against rising water. Many square miles of low area made it necessary for Hartford to build flood control stations.

Plan Now For Future Flood Control

Here's how Hartford, Conn., installed diesel-driven pumps in two stations for cheap insurance against repetition of vast damage caused by flood of 1955.

FLOOD control is vital. It involves lives and property. It really becomes complex when it concerns the safety of a city the size of Hartford, Conn. But regardless of size, every area that stands a chance of flooding, however remote the possibility may be, must be fully prepared. To do otherwise is foolhardy. It's cheap insurance against the much higher cost of flood damage.

Hartford, like many other New England towns and cities, found this out the hard way after the hurricane of 1955. Fortunately the city administrators have taken steps to guarantee that this disaster will not be repeated. One of the largest single installation of Caterpillar diesel engine pumping units in this section of the country furnish the protection.

Five miles of dikes protect Hartford from the Connecticut River during the flood stage. Two storm water pumping stations, the North Meadows and South Meadows stations, pump water from behind the dike out into the river. This dike gives flood protection from a river height as high as 45 feet.

These pumping stations are located two miles apart in low areas. Water over and above the capacity of normal draining facilities runs into these low areas and must be pumped out. The South Meadows station, because of the lowness of its surrounding area, has to start pumping when the river rises eight feet. At this point, elevation of a storage pond is kept down to about five feet.

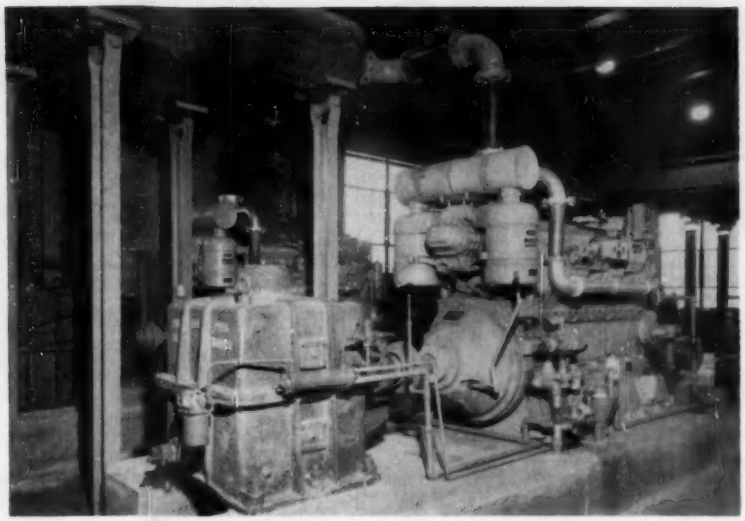
Prior to sale of the ten Cat diesel units by Phillip Pierce, engine representative of the H. O. Penn Machinery Co., Inc., the entire pumping load was carried by seven pumping units. The original capacity of both stations combined was 108,000 gpm. This was obtained through use of seven 36-in. pumps. Three of these were driven by gasoline engines and four by electric motors.

This total output fell far short of the minimum total capacity of 216,000 gpm needed to prevent flooding. This, plus the fact that the gasoline engines were becoming obsolete and parts were hard to get, prompted the City to switch to more efficient and dependable diesel power. Higher horsepower units were chosen to drive impellers of the existing pumps faster thus increasing capacity and making it possible to handle higher river heads safely.

Mr. Pierce worked closely with Mr. Lyman Lovell, Director of Public Works, city of Hartford, and with the city architect, Daniel J. Tosillo, planning of new installations. Pumping capacity of the two stations was based on the intensity of a 10-year rainfall curve determined from a 35-year record. To accomplish this, three Cat diesel-driven, 36-in. DeLaval pumps were required in addition to the Cat diesels to drive the original seven Morris pumps. The 10 units, six in the South Meadows station and four in the North Meadows station, give a total capacity of 375,000 gpm against a 30-ft head. This is far above the maximum requirement for safe flood control based on the above mentioned rainfall curve. With these stations going into full-capacity operation this year, the people can now rest easy. If this pumping arrangement had existed in 1955, flooding would not have occurred.

Pumping Station Equipment

The South Meadows station with four diesel-driven 38,000-gpm pumps and two 37,000-gpm pumps can handle 224,000 gpm. The North Meadows station has three diesel-driven 38,000-gpm pumps and one 37,000-gpm pump and is capable of handling 151,000 gpm. Each of



Diesel drives pump on floor below through power take-off and right-angle drive. Unit is typical of those in both pumping stations.

these pumps is driven by a Cat D397 Series D diesel through a clutch and 450-hp, 1200-rpm, spiral bevel right-angle drive. Drive ratios were varied to suit the new and the existing pumps.

Each diesel is supercharged with a Roots-type blower. Each is equipped with heat exchangers and temperature regulators for both water and lube oil. Safety controls shut down the engine to protect against high water temperature, low lube oil pressure and overspeeding. Audio and visual alarm systems warn of the above conditions prior to shutdown. Standard starting air motors and controls are included on the engine and dual air compressors and 32-cu ft receivers are used. A 20,000-gal tank stores fuel at the South station while a 10,000 gal fuel storage tank is used at the North station.

A Cat Model D318 diesel standby generator was also furnished to the South Meadows station. It is used to power starting air compressors and flood gates in event of public power failure. There are eight gates at this station and two more are to be added. Independent power must be available to insure operation of the gates as well as lights, heat and other essential equipment. An existing Buffalo gasoline engine-driven standby generator gives similar service at the North Meadows station.

Major Equipment

Diesel Engines	Caterpillar Tractor Co.
Fuel Injection Equipment	Caterpillar Tractor Co.
7—36" Water Pumps	Morris Machine Works
3—36" Water Pumps	DeLaval Steam Turbine Co.
Right Angle Drives	Philadelphia Gear Works, Inc.
Clutches	Twin Disc Clutch Co.
Heat Exchangers	Ross Heat Exchanger Div. American Radiator & Standard Sanitary Corp.
Temperature Controls	Amot Controls Corp
Alarm Systems	Viking Instruments, Inc.
Exhaust Silencers	Maxim Silencer Co.
No. 2 Fuel Oil	Shell Oil Co.

Four of six diesel pumping units in the South Meadows station. Auxiliary diesel-driven generator in center furnishes station lighting and power for starting air compressors and flood gates in event of public power failure.

Students in field mechanic's course work on International diesel tractor. Work is done under actual field conditions.

Instructor teaches student how to operate an Allis-Chalmers Model HD-5 tractor. Similar training is given on other equipment.

Course No. 111, eight weeks, 450 hours, trains men to operate the scraper, crane, back hoe, dragline and shovel shown.

Training Men For Today's Construction Needs

By Robert Dyment

COSTLY diesel-powered construction equipment must not be entrusted to unskilled men. The risk is too great. In addition, inefficient equipment performance makes its operation and upkeep costly and causes delays. Thus, trained men to operate and service a variety of this vital equipment are in great demand.

One institution that has done much to furnish qualified men to work and maintain various types of construction equipment is the National Schools of Heavy Equipment Operation. Aware of the plight of contractors whose jobs were slowed by lack of construction equipment operation and maintenance specialists, Gilbert Shaw, president of the schools decided to do something about it.

He founded the first National School in 1955 in Charlotte, N. C. In 1957, a second, the Western National School of Heavy Equipment Operation, Inc., was opened in Weiser, Idaho.

Today NSHEO graduates are doing a good job throughout the country. Their training has paid off for both themselves and the contractors. As part of this training, classroom work occupies only about one-third of a student's time. Emphasis is put on actual operation and maintenance of the machines. Manufacturers furnish about 50% of the equipment used at the schools under lease agreements. Nearly a million dollars are invested in facilities and equipment for the two schools.

Six courses are given at the schools, varying from two weeks (110 hours) to eight weeks (450 hours) per course. These cover operation and maintenance of all types of diesel-powered crawler tractors, self-propelled scrapers, crawler tractor-drawn scrapers, motor graders, cranes, back hoes, draglines, shovels, and asphalt finishers.

Plus these, the courses cover repair and maintenance of tracks, wheels, brakes, operating controls, etc. Welding techniques are also taught.

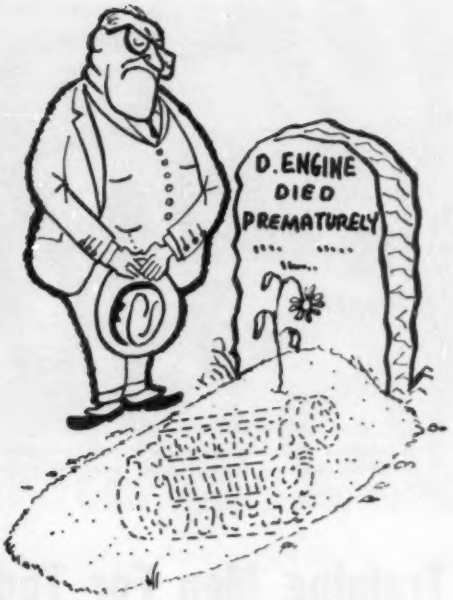
Many contractors send men to these schools for training. They believe that basic training in sound methods and techniques and systematic instruction in mechanisms and maintenance is far better than the old system of apprentice training. Equipment manufacturers even send sales personnel to these schools. Knowing the machine, how it works and how to service it, helps sell the equipment.

Both schools are still growing and performing valuable services to the construction industry. Skilled graduates, successfully operating vital equipment are rapidly making employers in the construction industry conscious of the value of training. And so it should be—considering that a single piece of equipment may cost from $15,000 to $100,000.

Cutting Corners Can Be Costly

By C. T. Baker

Three "horrible examples" taken from the notebook of a consulting engineer show how easy it is to save money on engine operation — and lose your shirt!



Case of the Bargain Fuel

A new 150-hp diesel engine was reduced to junk value by fire. This happened only about a year after its installation to replace purchased power. During this year, this modern unit turned out to be a good investment. Power production costs were cut to such an extent that the engine would have paid for itself within about three years.

But it didn't get the chance. One day, the plant owner was offered some "bargain" fuel oil. The seller claimed he was closing down and would dispose of his oil stock at 2-cents per gallon below market price to move it quickly. The engine owner bought sufficient oil to fill one of his storage tanks.

Shortly after switching to the low-priced fuel, trouble started. The engine would lose speed and at times stop completely. Investigation showed that the fuel strainers were quickly plugging with dirt and foreign matter. Servicing was required every few hours.

Finally, one morning a fuel line split. Oil was sprayed over hot engine parts and ignited. The building caught fire and damaged the engine to the point where it was sold for junk. With the building repaired, a contract was signed with the local utility for power and light, ending the day of diesel power in the plant.

During investigation into the cause of failure the fuel was checked and found to contain large quantities of fine sand and other foreign matter. Accumulations of these materials were blamed for the strainer plugging and the split oil pipe. In the condition found, the oil was unfit for use as diesel fuel.

Now, let's face it. No one is going to pass up a good fuel buy if there is reasonable assurance that its quality is suitable. However, the first case of strainer clogging should have been a red flag. Perhaps the fuel was okay but it was dirty. More strainer capacity—preferably a duplex arrangement to permit servicing without engine stoppage—was a minimum requirement.

Next, a good fuel filter should have been installed. An adequate fuel filtering system would have paid for itself in reduced maintenance of injection equipment. It would also have prevented the disastrous *results that* occurred. A good fuel filtering system is cheap insurance —it's always possible that you'll get a batch of dirty fuel.

The Case of the Frozen Pistons

Another 150-hp diesel was sent to the junk pile because its owner did not believe in controls for automatic protection of his machinery. He took the position that since a man was on duty 24 hours per day, there was no need for safety controls. Well . . .

In this case the engine was belted to a refrigerating compressor and a small generator to furnish lighting and power a few motors. Engine cooling water flowed by gravity to the jackets from an overhead 1500-gal tank. This was kept filled by a motor-driven pump.

There was no float control to start and stop the pump to maintain the tank's water level within pre-determined limits. As a result, the pump ran most of the time and water overflowed to the sewer. There was no low water level alarm or any protective device to stop the engine or give alarm in case of jacket water supply failure.

Early one morning, a fuse on the 3-phase pump motor blew. The motor, being better equipped than the plant, had a thermal cutout that finally stopped it. And with it, the only water supply to the tank. Only after the pistons seized, stopping the engine, was the empty tank and dead motor discovered.

Incidentally, the owner would not hold still for a supplementary connection to the city water supply to be used in case of water pump failure. This was an unnecessary expense. Fact is that it would have been in this case unless he also installed automatic controls to cut over in case of pump failure. He also took the same view of investing in a closed cooling system.

What happened to the plant? The engine couldn't be restarted and since the refrigeration unit had to be in operation as soon as possible, a motor was obtained and belted to the compressor. A contract was quickly signed with the local utility for complete lighting and power. The engine was sold at junk prices. Another diesel plant was gone.

Case of the Unfilterd Air

A pair of 300-hp diesels were so badly damaged by airborne dirt carried into the cylinders that a major and premature rebuild was necessary. Air intake pipes for the engine extended above the roof line of the building. A close-mesh wire screen was placed over the ends of the pipes.

The window screen was effective in keeping birds and even mosquitoes out of the engine, but failed in this sandy area. After an expensive engine rebuilding, involving reboring the liners and supplying oversized pistons, management finally agreed to install proper air filters for engine protection.

Cost of the rebuild and for the many hours of downtime was far greater than the cost of good air filters. And they finally bought them anyhow.

Commentary

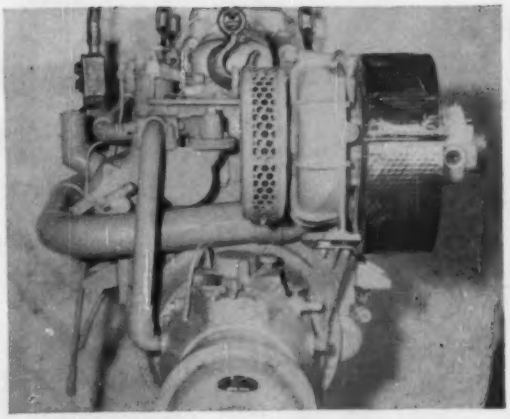
Most engine builders well know that one of the most popular indoor-and outdoor-sports of engine owners is to blame the engine builder for everything that happens to the engine. It isn't always fair as these cases show.

What can the engine builder do? The first thing is to pursue an unremitting educational program aimed at users. This can be gotten across through their sales and service organizations, industry magazines, bulletins, in fact, every possible means of communications.

Then they can keep insisting that everything be bought for a complete and safe installation. If the sales people can't get through to the user, at least they should get their recommendations — and the reasons for them — down in black and white. This could be "insurance" against the results of shortcuts.

Some organizations are creating an incentive for good installation and operation through guaranteed maintenance cost programs. Where they can see that engines are suitably rated, properly installed and protected, they know the engine will do its job with predictable costs.

Engine owners can save themselves a lot of grief if they'll just listen. It's rare that one knows more than the builder's representative or the consulting engineer. Learn from someone else's experience and not from some costly experience of your own.



Wrap-Around Insulation Confines Exhaust Heat

By R. E. Shoens

Insulation Engines, John-Manville Sales Corporation

EXHAUST gases heat turbochargers to temperatures that could injure personnel contacting them. Such temperatures also result in considerable heat being radiated to surrounding areas. This problem is worse when engines operate in confined spaces.

John Manville's Pre-Klad blanket insulation, normally used in aircraft jet engines has been redesigned for similar heat-confining functions in diesels. These preformed insulated blankets consist of J-M's cerafelt refractory fiber felt encased in heat-resistant stainless steel foil die-formed to fit contours of diesel turbochargers and adaptors.

Thus J-M's wrap-around insulation blankets make the turbocharger harmless to the touch and confine most of the heat within the turbocharger-adaptor area. Pre-Klad has been already installed permanently on three types of turbochargers and two kinds of adaptors.

Cerafelt is produced by a special process which converts molten refined refractory materials (mainly alumina and silica) into uniform ceramic fibers. These fibers, many times finer than human hair, have excellent thermal and chemical stability. When they are felted with binder, they form an insulating material that combines lightness, heat resistance (to 2000°F), low conductivity and high sound-absorption qualities.

The insulation is sandwiched between inner and outer foil jackets which then are spot or seam welded together into an integral component blanket or housing. A Pre-Klad housing is a combination of highly developed molding techniques, a preformed sub-assembly incorporating machined parts as required, and strengthened where necessary with light-weight structural members.

Principal servicing of dry-filter involves replacement of element. This is accomplished in only a few minutes.

Clean Air Cuts Costs

By Robert C. Blatt

Clean intake air means less engine wear. Where one filter may not have the capacity to remove enough dirt from the air, two in series will do it. Here's a case where this was proven.

BETTER air filtration cuts operating costs. Gaskill Construction Company, Riverside, New Jersey has proved this to their satisfaction. Use of two filters in series, according to Victor Holzinger, master mechanic for Gaskill, has doubled operating hours between overhauls and cut filter servicing time 80%. The experience has been gained on six large earthmovers.

Fram dry-type filters were mounted ahead of the standard oil-bath cleaners. Mr. Holzinger and other Gaskill officials are so pleased with results they are planning to add these Fram filters to oil-bath type on about 15 other off-the-road machines (bull dozers, road graders, scrapers, front end loaders, etc.).

The six big machines have been using the dry-type air filters for about a year while working on the new Route 60 at Haddon Heights in Camden County, N. J. From 8000 to 10,000 cu yd of earth are moved daily on this million-cu yd project.

Before these filters were installed, Gaskill officials were concerned over the frequency of engine overhauls on the earthmovers. Each overhaul cost about $2500 every 3000 to 4000 hours. Downtime for an overhaul was about seven days, which at 12-hours daily operation at $25 an hour cost about $2100. It was suspected that most of the trouble was caused by dust and dirt entering the 225-hp diesel through the engine intake equipped with an oil-bath filter.

These oil-bath filters had to be serviced at least once a day—sometimes more frequently. Servicing time for each filter was about one-half hour. Even with this, the average airbourne dirt conditions and the one filter's capacity to remove it all was inadequate. Although none of the engines have been overhauled since they were equipped with the dry-type air filters, Mr. Holzinger estimates that operating hours between overhauls will be extended to from 6000 to 8000 (80%). The Fram filters only have to be serviced twice a week and it takes only 15 minutes to remove the filter, blow out the dirt with compressed air and replace it.

Installation and Servicing

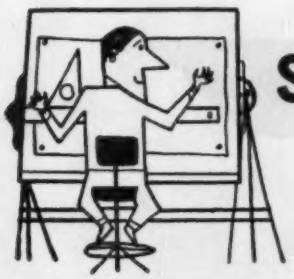
The dry-type filters are installed directly on top of and in series with the original oil-bath air filters. They are mounted on specially-made brackets. Since these filters have been installed, the oil bath filters are always relatively clean. They never need attention or cleaning except for an occasional inspection when the dry-type filters are changed.

Dry-type filters with their very large filtering area have low restriction to flow and can handle a lot of dirt. Normal engine vibration tends to make them self-cleaning as cake buildup shakes loose, and drops off. However, eventually a dirt coating, while improving efficiency, decreases air flow. This is when they must be cleaned or replaced.

Mr. Holzinger says that it is easy to set up proper servicing intervals. A vacuum gauge in the intake is one way to tell when air flow restriction gets too high. Also, high restriction upsets the air-fuel mixture and smoking will result. Trace smoke at normal cruising speed is an indication of excessive restriction. Continued smoky operation can be harmful, so after a little experimentation a servicing period can be set just short of the time when smoke occurs.

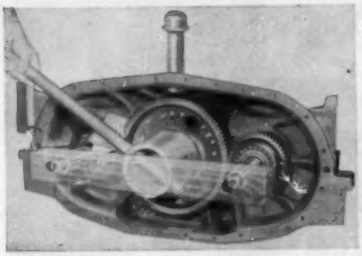
A blown-out (cleaned and reconditioned) or new cartridge is carried as a spare on each machine and only two minutes are required to change the cartridge. Replacement frequency of the dry-type filters varies from one to five weeks but averages about once a month.

Mr. Holzinger states that when using the oil-bath filter alone, a "smudge" buildup was generally found in the air duct when the filter was serviced. This indicated the inability of this single filter to cope with the dirt load and there was some carryover. With the Fram filters in series, the duct interior between the filters and the engine was always found clean. Mr. Holzinger and Gaskill officials are very satisfied with the performance of these filters in view of the results experienced over the past year.



service section

Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you



GM Power-Driven Shaft Retaining Nut

In the transfer gear assemblies used on Series 71 twin-engine units, the power driven gear is secured on the power-driven shaft by a 3-in.—12 hex nut located immediately forward of the gear. This retaining nut should never be removed or installed by using a hammer and drift as serious damage to the gear assembly could result.

The retaining nut should be removed and replaced by tool J4385 used in the following manner: Straighten ears on lock washer. Place a supporting member, with two 1 3/16-in. holes having centers 19 1/8-in. apart, over the clutch end of the two drive shafts, as shown. This prevents the shafts from spreading. With the gear housing in a fixed position and with a clean rag wedged between the gear teeth, turn tool J4385 counterclockwise to remove the driven gear lock nut.

When replacing the drive gear lock nut, use the supporting member, turn the nut clockwise, and tighten solidly against the lock washer. Bend ear of lock washer over several flats on nut.

On transfer gear assemblies having a drive flange on the rear end of the driven shaft, the flange is secured to the shaft by a special slotted lock nut. This nut should be removed and replaced with tool J4384, which is a large wrench similar to J4385, but having drive lugs which fit into the slots in the nut.

I-H Push Rod Side Cover and Crankcase Breather Leakage Corrected

Die cast aluminum push rod side covers with an improved crankcase breather are available through International Harvester's service parts under package numbers 273 069 R91 (front cover) and 273 070 R91 (rear cover).

Oil carry-over through the crankcase breather tube and leakage at the side cover gaskets can be minimized by installation of aluminum covers. This is done by using a breather tube having about twice the capacity of the old tube, and a redesigned breather body and baffle that traps oil and returns it to the crankcase.

Sealing ability of the cast aluminum covers is greatly improved over the displaced pressed-steel covers by providing a smooth, flat sealing surface that will not distort when properly torqued (7-10 ft lb), and by using a new gasket with improved sealing ability.

Due to the larger breather tube, normal crankcase blowby will be much less apparent.

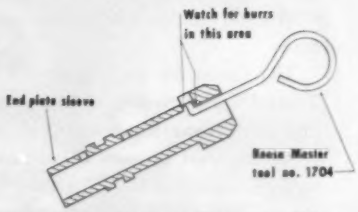
Full-Flow Lube Oil Filtration For Cat Industrial and Marine Engines

Advantages of full-flow oil filtration have been added to the Industrial and Marine arrangements of two Caterpillar Series D diesels according to Caterpillar Tractor Co.

Models D375 and D397 are now being supplied with 3- and 4-pleated, impregnated paper elements respectively. These will give complete filtration to the total volume of lube oil in the engines. This engine-mounted filtering system replaces the by-pass method formerly used.

Increased filter capacity and improved efficiency of the paper elements permit extended oil filter change periods.

For existing engines, oil filter changeover groups are available for field installation.



Removing & Installing End Plate Sleeve on Roosa Master Pumps

Extreme care should be exercised when removing or replacing the end plate pressure regulating sleeve during pump repair.

Through improper use of removal tool, a burr may be raised around the 1/8 in. hole provided in the sleeve for its use. A burr at this point will cause sticking of the regulating plunger and improper control of transfer pump pressure. This condition may cause excessive pressure which would affect automatic advance operation or fuel delivery at torque peak.

The sleeve removal tool #1704 is now made of brass to prevent damage to the regulating sleeve. In addition, it is long enough to reach and withdraw the priming by-pass spring at bottom of regulating sleeve bore.

On sand-cast and die-cast aluminum end plates, it is necessary to remove the inlet screen so that the lower regulating sleeve seal may be observed during installation of the sleeve to the end plate. It is essential that the lower seal does not catch and tear on the sharp edge at the point where the inlet bore enters the sleeve bore.

Application of clean mineral grease to the seal prior to assembly will allow it to slide into position easily.

industry news

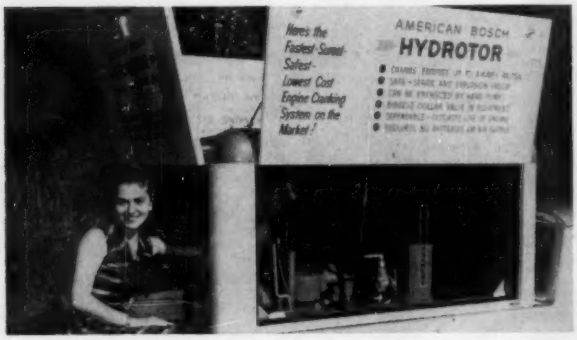
Alaska Gets Tribute From Maine Trucking Industry

The Alaska "Welcome Wagon," carried 20,000 lb of gifts which Maine is giving to the new state of Alaska. These gifts, totaling over 200 Maine specialties were given as a symbol of welcome and friendship from the most north-easterly state to the most north-westerly state.

The Cummins diesel-powered rig was sponsored by the Maine Truck Owners Assoc. in cooperation with Cummins Engine Co., Inc. and other manufacturers.

As the unit crossed the country, it was scheduled for stops at various Cummins headquarters. Drivers L. E. Weeks and R. Pierce are seen checking Cummins diesel in front of Cummins Service & Sales shop in Los Angeles.

After presentation of the gifts, the rig will go to the American Trucking Assoc. Convention in Miami, Florida. The complete tour will cover 13,176 miles.



Mobile Units Demonstrate Hydrotor

A fleet of mobile units are demonstrating the Hydrotor hydraulic engine-cranking systems throughout the country.

Each mobile unit consists of one of several popular makes of diesels on a Ford Ranchero, or on a trailer. The engines, equipped with the American Bosch Hydrotor cranking system, are started by flipping a hand control lever. These engines are complete with radiator and fuel oil tank so the demonstration can be repeated hundreds of times per day.

A.D.S. Meets Again

A total of 129 persons, representing 82 companies from the U. S. and Canada, registered at the largest and best meeting yet of the Association of Diesel Specialists, in Chicago.

A technical program covered such subjects as techniques of nozzle tip reconditioning and magnetic inspection practices as applied to injection equipment. There was also a forum on nozzle holders and tips. From the business point of view, inventory control and product liability were discussed.

An important phase of the meeting was the opportunity provided for service members to meet with manufacturers, both in scheduled private meetings and at the 12 exhibits sponsored by these manufacturers.

Other highlights were a trip to Woodward Governor Co. and inspection of facilities for injection equipment sales and service of the Illinois Auto Electric Co. of Chicago.

new products . Page 44
people and plants . . Page 48
new literature . . . . Page 52

Alcoa's Annual Engineering Conference

Aluminum's rapid growth as a construction material for high-strength welded structure, keynoted Aluminum Co. of America's second annual engineering conference, held recently in New York.

Interest in the aluminum-magnesium alloy series for structural applications, has been sparked by modern welding techniques. These alloys received major attention during the meeting. Welded aluminum structures in this series range from truck bodies to storage tanks.

The 37½-cu yd, 27-ton dump truck shown, is an example of what Alcoa is doing with wrought aluminum magnesium alloy and the latest welding techniques.

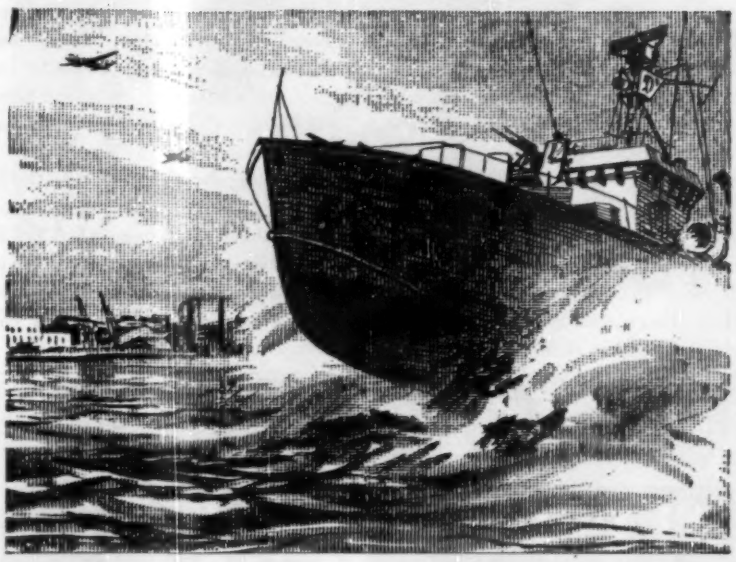
Power Show At N. Y. Coliseum

The 23rd National Exposition of Power and Mechanical Engineering will be held at the New York Coliseum December 1 to 5. The Exposition will be held under the auspices of The American Society of Mechanical Engineers in conjunction with its 1958 Annual Meeting. It will be open to members of the Society and guests associated with the power and related mechanical fields, exclusive of the general public.

Alco Diesel-Electric Drilling Power Packages

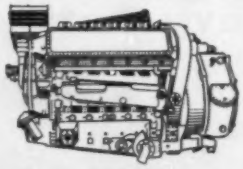
Three Alco diesel-electric drilling power packages are being completed at their Beaumont, Tex. plant. These units are for the Rimrock-Tidelands Drilling Co. They will power 1250-hp mud pumps instead of the 1000-hp pumps generally found on an inland drilling barge.

MORE POWER AT LOWER COST

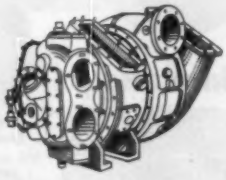


THIS IS NAPIER

GAZELLE 1200/2000 s.h. p. Free Turbine:
designed for strenuous duty and long service between overhauls. Chosen for R.N. and R.A.F. helicopters. Allows new flexibility in helicopter design. Its simplicity means economical and speedy maintenance.



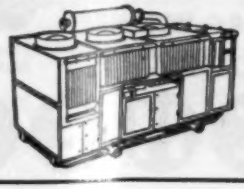
DELTIC 9 or 18 cylinder Diesel:
engine for merchant ships. Powers fast patrol boats and mine-sweepers of many Navies, police and passenger launches and the world's most powerful diesel electric locomotive. Deltic Diesel Engines are designed for power outputs from 825 to 3,100 h.p.



ELAND 3000/4000 e.h.p. Turbo Prop:
heralds a new era of economy for the airline operator and cheaper fares for the air traveller.
The Eland powers the Canadair 540 Airliner, the Fairey Rotodyne and the Westland Westminster Helicopter.

TURBO BLOWERS:
available in seven sizes for diesel engines afloat and ashore. Napier blowers give maximum power increase with low fuel consumption. Now in service in 24 countries.

DELTIC COMPAK
A compact source of power, easily transportable to normally inaccessible places, comprising Deltic Diesel engine plus generator, radiators, fuel tanks, pumps, etc. Road, rail and skid mounted sets at 1,200 kW and rail mounted sets at 2,640 kW. Weight 35,000 pounds. Envelope 24x8x11 ft



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Partners in Progress with
The ENGLISH ELECTRIC Company Ltd.

industry news

Diesels Carry the Mail

Man's transport progress in the past 50 years is dramatically illustrated on the Canadian Royal mail run from Calgary, Alta., to Moose Jaw, Sask.

In 1908 it took 10 days, a crew of men, relays of eight teams of horses and a train of covered wagons to haul the mail to Moose Jaw. Today, one Mack diesel truck completes the 450-mile trip in less than 50 hours.

Dual-Fuel Engine For Barquizimento, Venezuela

The City of Barquizimento, Venezuela, mid-way between Caracas and Maracaibo, is installing the 3200-kw generator set received from the General Electric Company's Large Motor & Generator Dept.

A Cooper-Bessemer LSV-16-GDT, dual-fuel turbocharged diesel drives the 4000-kva, 327-rpm, 4160-V, 3-phase, 60-cycle G. E. generator. This is the first dual-fuel engine for this plant which has an 18,000 kva capacity.

ROCKFORD

OIL FIELD TYPE

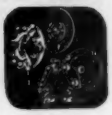
LONG LIFE
Heavy-Duty

POWER TAKE-OFF

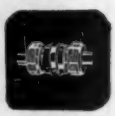
Makes Out-Board Bearings Unnecessary

- Eliminates the Pilot Bearing
- Release and Main Bearings are lubricated for one year
- Main Bearings are 40,000 hour type
- Handles 5,000 pound Belt Loads
- Out-Board Bearings and Flexible Couplings eliminated
- Furnished with Single or Double Plate, Organic or Morlife* faced Gear tooth Type Clutches

Insure longer work life and reduce down-time with this NEW extra heavy-duty ROCKFORD POWER TAKE-OFF.


Small Spring Loaded

Heavy Duty Spring Loaded


Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

BW SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER
1301 Eighteenth Ave., Rockford, Ill., U.S.A.
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

Cummins Diesel Powers Largest Aluminum Trucks

A 335-hp Cummins diesel engine, in a heavy-duty tractor supplies power for each of six aluminum coal haulers considered the largest light-metal trucks in the world.

The six units were delivered to Aluminum Co. of America in the coal-rich bottomland of southern Indiana. The bottom-dump haulers will be leased from Alcoa by the Squaw Creek Coal Co. to move coal 2½ miles, from strip mines to a tipple near Boonville, the "Coal Capital of Indiana." From here, the processed coal will be moved by rail to Alcoa's nearby Warrick (Ind.) power plant.

General American Transportation Co., Chicago, Ill., built the trailer which measures 37-ft long, 11-ft wide, and 9-ft deep.

Ford Enters Industrial Field With "Package"

A tractor-loader industrial "package" with 2½ times lift capacity of any previous Ford loader unit is in production by Ford Motor Co., Tractor and Implement Div. These units will be distributed through Ford industrial tractor and equipment dealers.

According to Ford, the new equipment, available with diesel power, is designed to close a gap between medium-capacity industrial power equipment and special-purpose earth-moving and construction equipment now on the market. It is larger and heavier than the Ford general-purpose tractors.

Robert Bosch Holds Sales Forum

Robert Bosch Corporation recently conducted a sales forum to indoctrinate new personnel with their policies and objectives and to make them intimately familiar with their products. Robert Bosch personnel is expanding in line with the company's increased activities in this country. This promises better sales and service facilities for their customers. This forum was conducted by Mr. W. Boedecker, sales manager (third from left) and Mr. T. Stevens, assistant sales manager (at right, front row).

Steam Cleaner Exchange

In 1954, the Clayton Mfg. Co. started its lifetime guarantee program whereby the owner of a Clayton-Kerrick steam cleaner could, within 10 years of the purchase date, exchange the cleaner for a factory rebuilt unit. The same model rebuilt unit can be obtained at 50% of the current price, with freight included both ways.

Since that time, because of unusual or severe service, 1000 Clayton-Kerrick cleaners have been completely rebuilt. The 1000th rebuilt unit has been shipped to its owner.

Dieselized Crusher Plant

Production exceeds 1500 cu yd of material per day on the dieselized crusher plant of the Wauconda (Ill.) Construction Co. This plant supplies roadstone for the construction of the Illinois Toll Road.

The company delivered more than 200,000 cu yds of crushed material to the north section of the toll road completed in July, 1959.

The plant is made highly portable by almost 100% use of truck-mounted power units. Both primary and secondary crushing units are powered by 6-110 GM diesels. Power for the system of connecting conveyors in the plant is delivered by a 150-kw. GM diesel-generator set.

AAF Training Course

American Air Filter Co., has begun its annual technical training program, with 15 graduates from 12 colleges and universities.

The 1600 H.P. Cleveland Diesel on the *Frances Turecamo*, most modern of tugboats, is efficiently and dependably serviced by a Maxim Spark Arrestor Silencer.

Maxim is consistently the choice with owners and operators who prize the advantage of time-tested, proven performance. Make Maxim your choice – your first cost is your last one.

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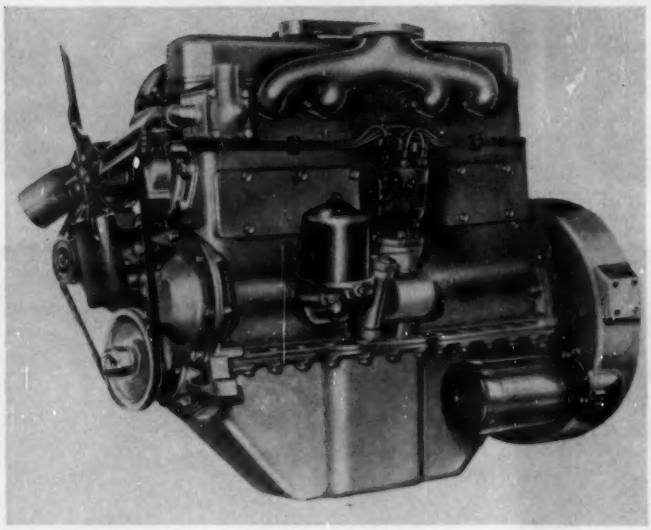
NAME

COMPANY

ADDRESS

new products



Hercules Offers 3000-RPM Diesels

Two 6-cyl DDH model diesels for applications using speeds of 1800 to 3000 rpm have been introduced by Hercules Motors Corp., Canton, O. A 298-cu in. engine is rated 112 hp and a 339-cu in. unit develops 122 hp, both at 3000 rpm.

These engines were developed primarily for marine use and for use in highway service equipment, particularly equipment using hydraulic torque converters requiring about 2200 rpm for efficient operation.

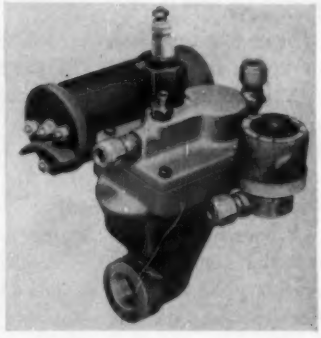
Principle differences between these engines and the DD models are higher speeds (DD line maximum speed is 1800 rpm), and increased crankpin and main bearing diameters.

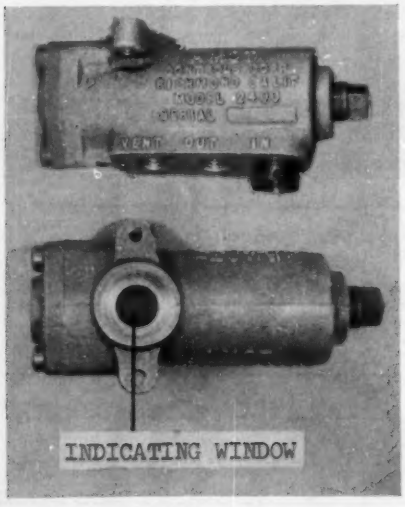
Gasifier Primer For Cold Starting

Hard starting of diesels in cold weather down to minus 65°F is said to be eliminated with use of the Reichhelm gasifier primer. Tests by the U. S. Government showed starts could be made in seconds even in Arctic temperatures.

The gasifier primer is a self-heat-generating unit which vaporizes fuel and blends the vapor with air to form a combustible mixture. This is readily ignited in the cylinders. The primer has no moving parts to clog, gum, or stick. It will operate on either 6 or 12 v-systems. This compact, unit can be installed with ordinary hand tools, no skill is required.

The Houston Co. of Wallingford, Conn. makers of custom valves for fuel systems, are the exclusive manufacturing and sales agents for the unit in this country.





Mechanical Safety Relay Tells Cause of Engine Shutdown

Amot's Model 2400 indicating relay, used in conjunction with their model 1476 safety control system, pinpoints the safety control component causing engine shutdown. One relay is used for each safety control component. When engine is started, each relay is automatically reset, and its window shows green.

In the event of a dangerous condition, for example, low oil pressure, the low oil pressure component in the safety control system will vent causing window in corresponding relay to show red. By going to the "red" position, relay vents another component in safety control system and shuts down engine. By examining panel board, cause of shutdown can be determined. Only component causing shutdown causes its indicating relay to show red. All other windows will be green.

Electrical power is not required. Air or gas pressure is used to hold relays in operating position. When engine shuts down, pressure is automatically cut off and system vented. This mechanical indicating system offers advantages where use of electrical systems are a fire hazard and where electricity is not available.

360-HP GM Turbopower Unit

The Detroit Diesel Engine Div. of G M. now has a 360-hp diesel. This adds a new high to the output range of their line of single engines for industrial applications. A 20% gain in horsepower has been attained through turbocharging the Series 110 model.

According to G.M., this increase from 300 to 360 hp is obtained with no appreciable increase in bulk, weight or fuel consumption. The turbocharger is in series with an engine-driven blower. Results include improved combustion, greater efficiency and better high-altitude performance.

The model 6-110T is available with base and radiator as well as a fan-to-flywheel unit. It has been developed for contractors' equipment and other portable and stationary industrial applications requiring a small, light-weight unit of high power output.

Cylinder Boring Machine

Cedar Rapids Engineering Co., Cedar Rapids, Iowa, has added the Model "FL" cylinder boring machine to its line of Kwik-Way precision engine-reconditioning equipment.

The Model "FL" has a capacity of 3 to 6¾-in. Cylinders larger than 6¾-in. can be bored by adding special equipment. Stroke is 18-in.

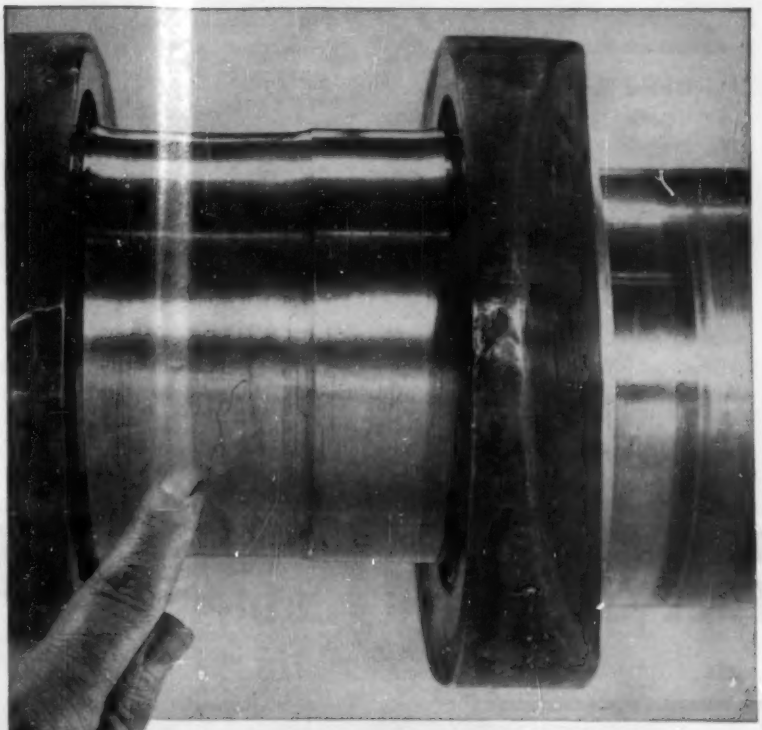
The new machine features fast automatic retraction and the same 3-finger centering, non-distorting anchoring, vee-belt spindle drive, preloaded spindle bearings, and easy, accurate tool setting of other Kwik-Way cylinder boring machines.

Diesel Gumout

Diesel Gumout in 1-pt and 1-gal cans has been added to the Gumout line of the Pennsylvania Refining Co. It is specifically made for use in diesel engines of all types.

This product is said to dissolve and remove gum and varnish that build up in diesel fuel systems. Injectors and injector nozzles are kept clean. In addition, it is said to remove water and moisture from fuel thereby giving protection against rust and corrosion.

Literature is available. Use the Readers Service Card in this issue.



THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!
We've specialized in rebuilding crankshafts, because since 1916 we've *made* crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-3

This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE
AND ORDNANCE COMPANY
Irvine (Warren County), Pa.

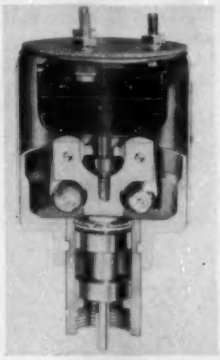
new products

Underspeed Governor

Underspeed governors for overload protection made by Synchro-Start Products, Inc., Skokie, Ill. are actually speed-sensitive switches which operate on the governor flyweight principle. Contacts are snap-acting and can be used to open or close a circuit on increasing or decreasing speed.

Overload protection is accomplished by adjusting the unit to trip its contacts slightly below normal runing speed. External circuitry can be arranged to stop equipment when speed drops, or as a warning device.

Governor shown is for direct mounting on a standard SAE tachometer drive.



FUEL INJECTION EQUIPMENT DIVISION
of
LUCAS ELECTRICAL SERVICES, INC.
Head Office: 501 West 42nd St., New York
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California
Branch Offices: 643 7th Street, San Francisco, California — 4937 West Belmont Ave., Chicago, Illinois
Canadian Distributers:
Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Quebec
AP174-820

Starting Fluid

The United States Aviex Co. has developed a 100% pure Ethyl ether starting fluid for diesel and gasoline engines. It is packaged in a convenient spray can that contains a new type propellent that does not mix with the starting fluid. Therefore, it is reported, that its ability to give quick starts at sub-zero temperatures is not hampered by dilution or condensation of the propellent.

Vibration Analyzer

A new vibration analyzer and portable balancer to measure vibration, pinpoint the cause, and correct it in-place, without costly dismantling of machinery is on the market. It was developed by the International Research and Development Corp., Worthington, Ohio.

The IRD Model 600 vibration analyzer is housed in a portable, hand-carried case. It is designed for use with diesel engines and other types of machinery.

A bulletin describing operation and application possibilities is available.

Rear Dump Variable Base Trailer

Maneuverability and smooth, controlled dumping are featured in the new rear dump, variable wheel base trainer now in production at Easton Car & Construction Co. Easton, Pa. It is designed for use with the Euclid (GMC) Model S-12 diesel tractor, and will be known as the S-12 rear dump. Rated capacity of the trailer is 22 tons.

Optical Flats In Fused Quartz Or Pyrex Glass

A full line of Crane Packing Co., Lapmaster optical flats is now available in either clear fused quartz or Pyrex glass. They are supplied in two certified accuracies, 1/10 or 1/5 light band, to cover a wide range of flatness reading requirements. Both types are double-surfaced to avoid reading error which commonly results from using the wrong side of a single-surface flat.

They are furnished in standard sizes from 1 to 12-in. diameter and are individually packaged in a sturdy velvet-lined box.

Perkins "Flat" Engines Exhibited

A "flat", underfloor, 6-cyl diesel (inclined at a 24 deg angle above horizontal) has been exhibited by F. Perkins Ltd.

The new model C.305, is being fitted in a new forward-control Commer 4-ton truck. The engine develops 87 bhp at 2400 rpm, its maximum governed speed. Maximum gross torque is 216 lb ft at 1300 rpm. It has a 3.6-in. bore, a 5-in. stroke and 305.3-cu in. displacement.

The C.305 in-line engine is equipped with a flange-mounted C.A.V. distributor-type fuel pump and hydraulic governor. The engine has renewable chrome-plated liners, 7-bearing crankshaft, twin-hole injectors, and a C.A.V. thermostart for cold weather starting.

Aluminum Tilt-Cab Diesel Tractors

A new concept for diesel highway tractors has been announced by the GMC Truck & Coach Div. of GM. Two new highway hauler models are now in their final road-test period before production. Extreme light weight and safe operation are said to be obtained by use of stabilized air ride, independent front wheel suspension, fabricated frames and aluminum tilt cabs.

Both units are only 48-in. from bumper to back of cab. Aluminum construction is made possible by using a new type of air suspension to absorb road punishment according to GMC, the units can carry from 699 to 2,097 lb more payload than comparable models.

Safe driving advantages are said to be inherent in the independent front wheel suspension that departs from the conventional front axle with leaf springs. Ease of steering, handling and ride reduce driver fatigue.

Universal Geared Plierench

New models of the Plierench in 7-in. and 8½-in. sizes have been put on the market by the Plierench Co. of America, Chicago.

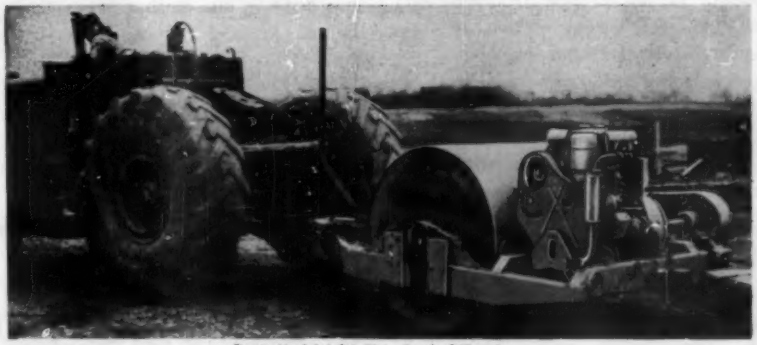
The Plierench can be used effectively as a socket and angle wrench, clamp, vise, ratchet wrench, wire wrench, pipe wrench, spring maker and for other repair, maintenance and production.

The Plierench features: a 10-to-1 ratio jaw-to-handle leverage; a 1-ton gripping power; a geared transmission; jaws that always remain parallel; automatic jaw lock; and split-second ratchet and gear shift jaw adjustment. A complete Plierench kit includes universal jaw, pipe jaw, wire bender, tube cutter, and giant pipe and expando jaws.

TERRAPAC'S

1600 vibrations a minute...a breeze for

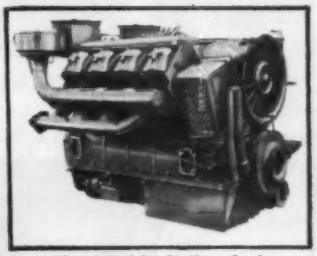
DEUTZ AIRCOOLED DIESELS



Deutz Model A 2 L 514—2 cyl., 162 cu.in.

8,000,000 yards of sand fill were compacted at Griffith Air Force Base in Rome, N. Y. with 12 Vibro-Plus vibratory rollers. Only Terrapacs hit better than 100% density. Terrapacs proved their ability to do the job better with fewer passes, at less cost per yard.

Working 20 hours a day, the contractor ran Deutz Aircooled Diesels in compaction tests. Deutz Diesels have since been mounted on all the units. Deutz' reliability, reduced downtime and the quick availability of parts played an important part in the selection. Naturally, Deutz Aircooled Diesels eliminate all the usual problems connected with liquid-cooling—no radiators to break down, no hose connections and water pumps to spring leaks. Deutz Aircooled Diesels were also selected for their top operating efficiency at temperatures of up to 140°F. You'll find DEUTZ powering graders, earthmovers, shovels, concrete mixers and generator sets... doing construction's toughest job everywhere.



Deutz Model A 8L 614 — 8 cyl.

Send for free information on AIRCOOLED DEUTZ DIESELS from 5 to 250 HP in 1, 2, 3, 4, 6, 8 and 12 cylinder models.

DIESEL ENERGY CORPORATION
82 BEAVER ST., NEW YORK 5, N. Y.

DEUTZ DIESEL ENERGY CORPORATION RH-12
82 Beaver Street, New York 5, N. Y.

I am interested in more details on use of the DEUTZ AIRCOOLED DIESEL for the following purposes:

☐ INDUSTRIAL ☐ CONSTRUCTION ☐ DEALER
☐ OPERATOR

Name_____

Address_____

City_____ Zone_____ State_____

people and plants

P. J. Louzecky

Nordberg Gets New Chief Engineer

Paul J. Louzecky is the new chief engineer of the Engine Div. of Nordberg Mfg. Co. Prior to joining Nordberg he was chief technical engineer for the Cleveland Diesel Engine Div. of G.M.

In his new position Mr. Louzecky is in complete charge of all engineering phases and all engineering personnel of the Engine Division, including installation, service, testing and research development.

Louzecky is a member of the Society of Automotive Engineers, American Society of Mechanical Engineers, and other engineering societies.

Sales Manager For Sunnen

Sunnen Products Co. of St. Louis, manufacturers of precision honing equipment, has acquired a new sales manager. Kenneth P. Martin has been appointed industrial sales manager. Before coming to Sunnen, Mr. Martin was associated with LeMaire Machine Tool Co.

C. Lee Cook Appointment

V. R. Hershberger has been appointed as sales representative for the C. Lee Cook Co., manufacturer of piston rings and rod packing rings. He will cover all of Eastern Ohio.

Mr. Hershberger, has been in the field of sales engineering for the past seven years. Most of this experience has been in the mechanical packing field.

Koppers Promotions

Robert J. Green has been named manager of direct accounts for the piston ring and seal department, Koppers Co., Inc., Baltimore, Md. He was formerly located in New York City as Eastern District manager of Koppers Metal Products Division.

In his new position, Mr. Green will be responsible for the administration of all sales accounts handled directly by the product department.

Earl L. Wilson, Jr. replaces Mr. Green as Eastern District sales manager. In his new position, Mr. Wilson will direct the Division's sales activities in eastern New York state, northern New Jersey and New England.

Manager Of White Diesel's Seattle Branch

Harold R. Ginther has been named Seattle branch manager for the White Diesel Engine Div. of the White Motor Co. He replaces Fred Hudson who retired.

Mr. Ginther has, until recently, been Seattle area manufacturer's representative for a Portland, Oregon, firm representing national lines of industrial and marine equipment.

Standard Equipment on more diesel engines than any other make!

Proved 125,000,000 times!

The long-time preference for Bendix* Starter Drives on diesel engines is based on hard facts such as these. It is simpler in design, it is more easily mounted—and in more positions. It requires no actuating linkage—therefore the solenoid can be placed in any convenient position. And it delivers performance, economy and durability far beyond any other drive. Whatever your type of diesel, it'll start *better* with a Bendix drive. *REG. U. S. PAT. OFF.

BENDIX STARTER DRIVES

Bendix-Elmira
Eclipse Machine Division
Elmira, New York

Bendix AVIATION CORPORATION

SALES and SERVICE on HYDRAULIC and MECHANICAL GOVERNORS and FUEL INJECTION EQUIPMENT

Expert Factory-Trained Personnel
Factory-Approved Equipment

Fully equipped Governor Dep't. Left to right: Aircraft, Railroad, Industrial and Automotive Governor Test Stands.

Complete facilities for Woodward, Farris-Pickering, Marquette and Pierce Governors

A & D DIESEL SERVICE
143 21st. Street
Brooklyn 32, New York
Phone STerling 8-4222

ASSOCIATION of DIESEL SPECIALISTS — ACCREDITED DEPENDABLE SERVICE — Member — A·D·S

KIENE®
DIESEL
indicator valves

OPERATES AT PRESSURES UP TO 10,000 PSI

Kiene valves have effective gas seal both open and closed without packing or glands. Operate against pressure — will never blow open. Small and rugged — 4¼" in length with only 3¼" circle of space for attachment. Kiene valves give better service under the most severe conditions. Standard indicator plug and wing nut connection.

Furnished with male ½" NPT engine connection. Other threads on order. Adaptations for most diesel locomotive engines.

SEND FOR BULLETIN V-10

KIENE DIESEL ACCESSORIES, INC.
10353 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

General Metals Corp. V-P

Arthur W. Ostrander has been elected vice president for sales by the Board of directors of General Metals Corp. His promotion to the top sales job in General Metals follows a successful job as sales manager of the Enterprise Engine and Machinery Co., a sales subsidiary of General Metals. He will continue to manage Enterprise sales.

Initially he will launch a major sales effort for the General Metals foundry and forge division.

ATI Muffler Production Increased

Alexander-Tagg Industries, Inc., Hatboro, Pa., reports they have increased by 50% their production of ATI engine-mated heavy-duty truck and bus mufflers. This production increase has been accomplished by means of multiple-press operations, better material flow, versatility in placement of portable production equipment to meet current requirements and maximum usage of fork lift handling of special stacking bins for parts stowage.

E. A. Horiak

J. L. Biasetti

H. Cuthbert

R. E. Kerr

Hercules Engineers Get New Responsibilities

Four key engineers of Hercules Motors Corp. have been assigned new responsibilities.

Dr. Erwin A. Horiak, chief engineer since 1954, has been named director of engineering. Dr. Horiak joined Hercules as a research engineer in 1935. He became chief engineer of the Diesel Div. in 1943.

Assisting Dr. Horiak, who will have the responsibility of carrying out the company's entire engineering program will be: J. L. Biasetti, chief engineer, who joined Hercules two years ago as an executive engineer; Harry Cuthbert, chief engineer-advanced engineering, who joined Hercules as assistant chief engineer in charge of the Air-Cooled Div. He will be in charge of all new product development work. Robert Kerr who has been employed as a development engineer at Hercules for two and a half years. He will be in charge of all experimental laboratory activities.

Hall-Toledo Appoints Chief Engineer

John Kozak has been appointed chief engineer of Hall-Toledo, Inc. He succeeds George Aberl who resigned recently.

Mr. Kozak will be responsible for development of new products, and will be charged with development of present manufacturing facilities. Hall-Toledo is actively engaged in the manufacturer of service and production tools and equipment for use in diesel, gasoline, engine markets.

people and plants

American Marc Appointments

William D. Brumback has been appointed as vice president and general sales manager of American MARC, Inc. He joined the company in April, 1958 as director of OEM sales.

Frank S. Hill is now sales promotion manager of the company. He was formerly assistant advertising manager of the Fluor Products Co.

Purolator Appointments

In line with their plans to broaden the scope of customer service and application research, Purolator Products, Inc., Rahway, N. J., has made several appointments. Jules Kovacs, vice-president, has been placed in charge of technical sales, and H. C. Mouwen has been named manager of the Research & Development Department.

Eugene B. Delaney has been appointed general manager of the Wayne (Mich.) Div. of Purolator Products, Inc. and T. E. Coffman as branch manager of the Detroit sales office.

G. W. Ferguson

New Texaco Technologist At Los Angeles

G. W. Ferguson has been named technologist in the Los Angeles Office of Texaco's Research and Technical Dept. He was formerly on the staff of the manager of technical services at the Texaco Research Center in Beacon, N. Y.

Mr. Ferguson joined the Texas Co. in 1947 as a mechanical engineer in the Products Application Dept. at the Texaco Research Center. He is a member of the ASME and the author of various articles on engines, fuels, and lubricants.

American Air Filter Additions

Glen M. DeBaker has joined the Milwaukee Branch Sales Office of the American Air Filter Co., Inc., as a sales engineer. He was formerly connected with the Milwaukee consulting engineering firm of Lofte & Fredericksen.

American Air Filter Co., Inc., has added the R. J. Clark Equipment Co., Inc., Clearwater, Florida, to its list of sales representatives.

Cooper-Bessemer Appointments

Freeman A. Gehres is now Cooper-Bessemer branch office manager in New Orleans. Since the opening of C-B's combined New Orleans office and warehouse in 1952, Mr. Gehres has been serving as assistant branch manager.

Phil S. Hurst has been promoted to assistant product manager, Gas Engine Compressor Sales. In his new capacity, he will assist Mr. Don Reed, Product Manager, Gas Engine Compressors.

Henry P. Thompson Co. has been appointed as sales representatives C-B air compressors. They will handle the application and sale of both reciprocating and centrifugal compressor units in the greater Cincinnati area. This includes Kentucky and southern sections of Ohio and Indiana.

FREE to Every Shop Operator

- Diesel Compression Testers
- Nozzle Testers for American Bosch, Caterpillar and Bendix Nozzles
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- General Motors Injector Testers
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- Engine Overhaul Stands
- Engine Removal and Parts Dollies
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AD-15

STATEMENT OF THE OWNERSHIP, MANAGEMENT AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233)

State of Connecticut } ss.
County of Fairfield }

Of DIESEL POWER published monthly at Kutztown, Pennsylvania, for October, 1958.

1. The names and addresses of the publisher and editor are: Publisher, G. Renfrew Brighton, 80 Lincoln Avenue, Stamford, Conn., Editor, Brian P. Emerson, 80 Lincoln Avenue, Stamford, Conn.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)
Diesel Publications, Inc., 80 Lincoln Avenue, Stamford, Conn.; The estate of Jessie W. Rosencrans, Chappaqua, New York; Dorothy R. Brighton, Chappaqua, New York; George R. Brighton, Chappaqua, New York.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state).
None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bonafide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

DIESEL PUBLICATIONS, INC.
G. RENFREW BRIGHTON, Publisher

(Signature of editor, publisher, business manager, or owner)

Sworn to and subscribed before me this 2nd day of October, 1958
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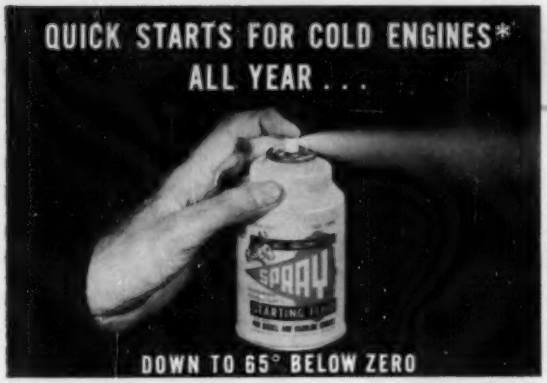
State of Connecticut No. 12039
Qualified in Fairfield County
Certificate filed with Fairfield County Clerk
Commission expires April 1, 1962



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*Until the engine reaches normal operating temperature it is a cold engine.

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With a new Multi-range, Multi-purpose Adapter you can step up the capacity of your Torque Wrench to a new high range and you can plug in any drive end you want . . . Box wrench, ratchet, drive square for sockets.

All drive end accessories are interchangeable and stock items.

In this way each Sturtevant Torque Wrench effectively equals two complete sets of ordinary single purpose Torque tools.

Only Torque wrenches with the Sturtevant patented pivoted handle can be assembled with adapters.

WIDE CHOICE OF INTERCHANGEABLE DRIVERS

write for No. SD-77 catalog sheet

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ADDISON QUALITY ILLINOIS

News of Cummins Distributors

To keep pace with its present steady growth and prepare for expected future expansion, Cummins Sales & Service, Inc., Fort Worth, has moved into larger offices. It is also remodeling and adding to several of its factory-type shops.

The shop of Cummins Sales & Service, Inc., at New Orleans has been expanded. Parking has also been added. The shop and parking lot at Oklahoma City have also been enlarged. Future plans call for the shops in Wichita, Kansas and in Dallas to be greatly enlarged.

Cummins Piedmont Diesel, Inc., has taken over the distributorship of Cummins diesels in 62 North Carolina counties. They have acquired certain assets of the Cummins Diesel Sales Corp., of High Point, the former distributors in this area.

J. R. (Jim) Neal has been appointed vice president and general manager of Cummins Arizona Diesel, Inc. He has been general manager of Cummins Service & Sales, Southern California distributor of Cummins products, for the past 13 years.

La Verne Morgan has been appointed shop superintendent for Cummins Service and Sales, Southern California distributor of Cummins diesel engines. He will have supervision over the company's shops at Los Angeles, Bakersfield and Montebello.

Miehle-Goss-Dexter Subsidiary Changes Name

The name of Christensen Machine Co., Racine, Wis., has been changed to M-D Blowers, Inc. The company will continue to operate as a subsidiary of Miehle-Goss-Dexter, Inc., Chicago.

M-D Blowers produces industrial blowers and rotary superchargers for general industrial uses.

USE BELL INJECTOR CUPS and TIPS

STANDARD AND 21° FOR THE LEADING TRUCK DIESELS

Years of proven service
Volume production on automatic machines means SAVINGS
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Pioneers in research and manufacture of high speed diesel injection equipment.
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M. R. Fairlie

K. A. Smith

Sinclair Forms New Divisions

Sinclair Research Laboratories, Inc., have formed two new divisions. These are designed to streamline automotive and industrial research activities.

A Products Division was formed to consolidate all functions of product research and development formerly conducted by the Lubricants, Engine Laboratories, Light Oils and Research Divisions.

A Process Division was organized to absorb all research, development, experimental, and refinery application activities of those divisions.

Heading the Products Division is M. R. Fairlie, formerly in charge of the Lubricants Division. Dr. K. A. Smith, formerly head of the Light Oils Division, is in charge of the Process Division.

new literature

Hydraulic Data For Rotary Pumps

A hydraulic data bulletin by the Blackmer Pump Co., assist's operators, engineers, maintenance supervisors, distributors and other technical men in planning installations of rotary pumping equipment.

It outlines the factors involved in pump selection and gives definitions of commonly used hydraulic terms. The 28-page bulletin No. 33 describes two basic methods for computing the suction and discharge conditions of a given installation.

The bulletin also covers: a variety of data to assist in pump selection; construction recommended for handling various industrial liquids; methods of viscosity measurement; definitions of viscosity terms; 100 common liquids showing specific gravity and viscosities at various temperatures; handy conversion tables; and pipe friction curves.

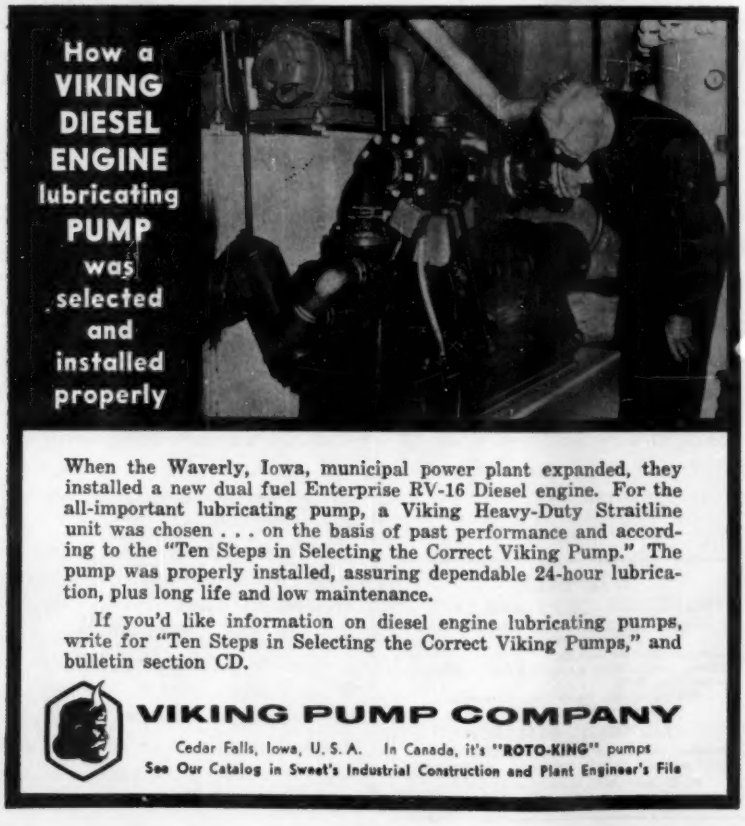
Heavy-Duty Low-Pressure Compressors

Bulletin A-95 covering the Joy Mfg. Co. line of heavy-duty, low-pressure compressors is now available. Specifications on three models ranging from 756 to 7392 cfm and a detailed sectional drawing are included. A complete run-down with illustrations on all vital parts and features is also included.

Flexible Metal Hose

A 40 page bulletin by Penflex is a useful guide in selecting proper flexible metalic tubing for your diesel.

This bulletin by the Pennsylvania Flexible Metalic Tubing Co., Inc. gives recommendations for installation. It also explains how the tubing absorbs vibration and expansion and corrects for pipe misalignment when used with diesel exhaust and air intake piping, supercharger piping and air starter, fuel oil, lube oil and water lines.



When the Waverly, Iowa, municipal power plant expanded, they installed a new dual fuel Enterprise RV-16 Diesel engine. For the all-important lubricating pump, a Viking Heavy-Duty Straitline unit was chosen . . . on the basis of past performance and according to the "Ten Steps in Selecting the Correct Viking Pump." The pump was properly installed, assuring dependable 24-hour lubrication, plus long life and low maintenance.

If you'd like information on diesel engine lubricating pumps, write for "Ten Steps in Selecting the Correct Viking Pumps," and bulletin section CD.

VIKING PUMP COMPANY

Cedar Falls, Iowa, U. S. A. In Canada, it's "ROTO-KING" pumps

See Our Catalog in Sweet's Industrial Construction and Plant Engineer's File

Gas Engines For Package Compressor Installations

Compressor service applications in the petroleum industry for Superior high-compression 200-700-hp gas engines are detailed in two new bulletins. These are issued by the White Diesel Engine Div. of the White Motor Co.

Bulletin 119 contains features, specifications, dimensions, rating curves, and optional power take-off data on the Superior 6G-510 engine. Included are illustrations of the block, gear drive train, new components, and the 6G-510 in action.

Bulletin 120 provides the same information and similar photographs on the Superior 6 and 8-cyl G-825 Series. Performance characteristics, including fuel economy through high compression engine design, are stressed in both folders.

Caterpillar Brochure

A two-color brochure explaining features of the new Caterpillar DW21 (Series D) and DW20 (Series F) wheel tractors, has been published by Caterpillar Tractor Co. It deals primarily with the two most outstanding new features of these machines—the Super-Turbo diesel engine, and torsionflex seat for reduced operator fatigue.

To point up the higher work speeds and increased torque rise afforded by the new engine, travel times from an actual job are cited, along with graphs showing comparative torque rise characteristics of the new machines and their predecessor models.

A detailed explanation of the new Pressure Ratio Control system of air induction, which allows the turbocharger to cover a more complete range of operating speeds, is also included.

Sun Oil Company Products

A new booklet gives information on Sun Oil Company's complete line of industrial products. These include among others diesel lube oils, general and specialty lubricants and greases.

(*Continued on Page* 55)

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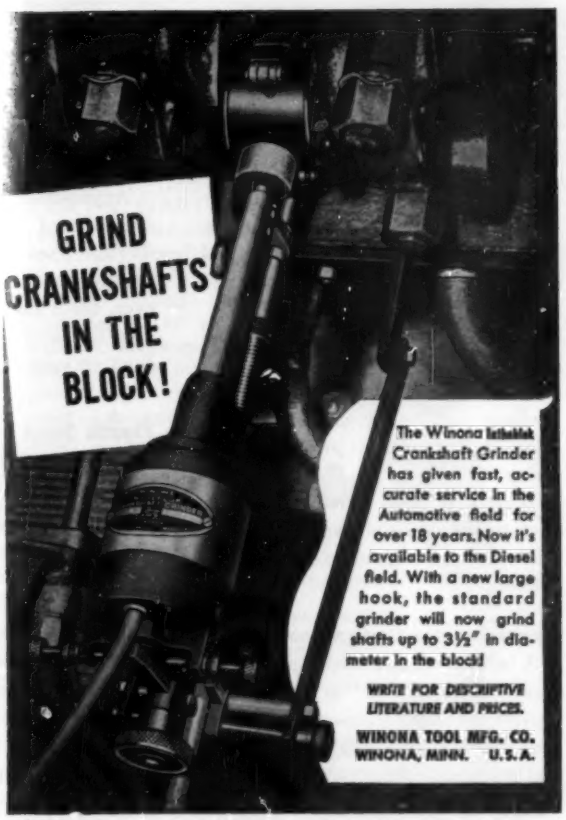
Amazing New CARBURETOR Cleaner. Fast! Economical! Will not harm any metal . . . not even pot metal. No heat required.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The Winona Lathelek Crankshaft Grinder has given fast, accurate service in the Automotive field for over 18 years. Now it's available to the Diesel field. With a new large hook, the standard grinder will now grind shafts up to 3½" in diameter in the block!
WRITE FOR DESCRIPTIVE LITERATURE AND PRICES.
WINONA TOOL MFG. CO.
WINONA, MINN. U.S.A.

new literature

(*Continued from Page* 52)

Dry Fluid Drives Bulletin

A new expanded line of Flexidyne Dry Fluid Drives and Couplings is described in a 24-page bulletin. Complete with product photos, engineering drawings, and installation pictures showing applications in a broad cross-section of industry, it explains how many different drive problems are solved.

The new line includes 10 stock couplings and 8 stock drives ranging from fractional to 1000 hp and suitable for wide range of applications. Tables facilitate selection for normal and heavy-duty service.

Tong Test Ammeters

Its complete line of tong test ac-dc ammeters is covered in a catalog by Columbia Electric Mfg. Co. The new bulletin illustrates eight types of instruments and gives detailed information on the selection, ordering and use of tong test ammeters.

Chandler Fastener Bulletin

The Chandler Products Corp., makers of fasteners for industry, is offering its 30th anniversary products bulletin. It outlines broad types of precision-engineered fasteners available with special features. It also contains numerous illustrations of cold-forged fasteners produced for the diesel engine, farm equipment and other industries.

FOR SALE

FAIRBANKS-MORSE DIESEL
Model 32 E 14
Engine No. 903102
Horse Power 300
RPM 300
Cylinders 4

FAIRBANKS-MORSE ALTERNATOR
Ser. No. 573936
Type TGZO
KVA 250
RPM 300
Volts 2400, three phase

Above direct-connected diesel-electric unit is complete with air compressor, air starting tank, closed circuit cooling heat exchanger, modern switch board with oil circuit breaker, and meters.
Unit has been run less than 8 hours since overhaul. May be started and operated at full load for inspection.
Unit was purchased new in 1947. Contact Lincoln Electric Cooperative, Inc., P. O. Box 328, Eureka, Montana.

Thermometer Brochure

An illustrated booklet describing its complete line of stainless steel thermometers has been issued by W. C. Dillon & Co., Inc. It lists complete specifications and prices on the more than 100 Dillon angle-form, straight-form and special-purpose thermometers available.

Wire and Powder-Sprayed Coatings Of Metals and Ceramics

A basic engineering data Bulletin 136A on wire and powder-sprayed coatings of metals and ceramics has been released by Metallizing Engineering Co., Inc. This data has been compiled for product designers interested in investigating special properties of sprayed metal and ceramic coatings.

The new bulletin covers a wide range of mechanical applications such as for heat protection, wear resistance, corrosion resistance and protection, heat and abrasion resistance, hard-facing and weight reduction.

new literature

Case History Booklet On 99 Honing Jobs

Sunnen Products Co., manufacturer of precision honing equipment, is offering a new 16-page case history booklet. It gives production rates, size, tolerance, stock removal and finish data on 99 widely diversified parts from ⅛-in to 2¾-in. I.D.

Entitled "Typical Applications," the booklet, will be of interest to all concerned with bore-sizing problems and looking for better and more economical methods in precision hole sizing.

Illustrated with photos of each part, the problems shown cover many materials. All are indexed for easy reference.

Dynamometer Design Book

A special design and application book with dozens of "on the job" illustrations of dynamometers at work is available from W. C. Dillon & Co., Inc.

These photos show how to make spring testers, measure deflection, check railroad switches, engine torque, etc., with portable traction dynamometers. All views are 8 x 10 in size. Each includes pertinent engineering data and related facts.

Applications in different industries are indexed for quick study in the 81-page book. Cost of compiling and printing is over $5 per copy. However, for a limited period it is available for only 50c if you request a copy on your company letterhead.

Plastic Steel For Emergency Repairs

"Devcon Products for Emergency and Maintenance Repairs" is the title of a new bulletin available from Devcon Corp. Through case histories, the bulletin describes savings in time and money that Plastic Steel and other Devcon products have made possible in repairing machinery in many industries. Illustrated are repairs on the waterside of diesel engine liners, pump casings, etc.

Plastic Steel hardens to steel-like strength two hours after the addition of a hardening agent. It bonds steel, bronze, iron, aluminum, etc. and many other materials to themselves or each other. No heat or pressure is required for hardening.

Onan Marine Line of Generating Plants

How Onan "All-Craft" electric plants provide dependable power afloat is the theme of folder F-133 just issued by D. W. Onan & Sons, Inc.

Illustrated and described in detail are 1-cyl, diesel-driven 3-kw units; several gasoline-engine driven units; and battery charging generators used with propulsion engine belt drive.

The folder can be obtained in both English and in Spanish.

Stationary Battery Bulletin

C & D Batteries, Inc. have just released a new 12-page bulletin, CP-532. It covers the use, design and construction of the firm's standard line of PlastiCell lead-antimony grind batteries for all stationary battery applications.

GET POWER-PAC!
THIS CONCENTRATED DIESEL ADDITIVE WILL
• PEP UP ENGINE POWER
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Synchro-Start Model GA-3 speed sensitive switches are suitable for installation on AND20005 aircraft tachometer drive pad.

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These units are adjustable while running, splash proof, and have a flexible drive shaft to compensate for mounting misalignment. They can be supplied to open or close 3 separate circuits at any speeds between 1,200 and 6,000 RPM in the standard governor. Special speeds either above or below the standard model must be referred to our Engineering Department.

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KIM HOTSTART pre-heaters circulate hot water through engines when they are not in use; protect them against bitter winter weather; keeps engines responsive to the touch of the starter. Lightweight; low cost; high in savings. Thousands in use.

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★ *Easy to install*

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One Problem of Vapor-Phase Cooling Solved

The Dow Chemical Co. has developed its first product specifically designed for use in Vapor-Phase cooling (also known as ebullient cooling). Dowtherm 209, is said to solve one problem of vapor-phase cooling (removing heat at high temperatures by flashing water into steam).

Attempts to use a standard antifreeze have not been generally successful, since this material will not form a constant boiling mixture with water. Though water in the engine itself may be protected, vapors produced by the boiling mixture contain only water which can freeze in the condensate return line.

A new bulletin explains how, Dowtherm 209 carries over in the vapor in the same proportions that it is retained throughout the system. It tells how Dowtherm as an azeotrope gives freeze protection both in the engine and in the condensate return line. Dowtherm also contains inhibitors which are designed to prevent rust and scaling in the cooling system.

Alnor Pyrotroller

The new Alnor Pyrotroller, an indicating-controlling pyrometer made by Illinois Testing Laboratories, Inc. is illustrated and discussed in detail in Bulletin No. 3885.

Designed features of this instrument have established it as one of today's most successful electronic pyrometer controllers.

Its simple yet rugged circuitry has a minimum of components. All are of standard manufacture, operating well below their rated capacities. There is no need for repeated adjustment and no shifting of the control point.

Active, well rated distributor wanted for well known Italian make of industrial and marine Diesel engines and generator sets. Diesel from 3-195 HP, generator sets from 4-160 KVA.

Write Box DE11-581, c/o Diesel Power, 80 Lincoln Ave., Stamford, Conn.

The "Alco Review"

The "Alco Review", a magazine published by Alco Products, Inc., four times a year, is available to all our readers. Informative articles dealing with Alco diesel engine installations, development, operation, servicing, etc., appear frequently in this publication.

For example, an article on electric control for oil and gas-well drilling is featured in the Summer-Fall issue of "Alco Review". This article describes Alco's use of electric control for its drilling rig diesel power packages.

Precision Hand Tachometer

Bulletin 35-69 by James G. Biddle Co., entitled "Speed Measuring Instruments", covers and illustrates a wide selection of ranges and types of tachometers. Included is the new Jagabi precision hand tachometers recently placed on the market.

The bulletin shows and describes in detail the Biddle line of tachometers giving data on: rpm range; percentage of accuracy; application; operation; and accessories.

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advertisers index

A & D Diesel Service, Inc. 49
American Bosch Arma Corp. 3

Bacharach Industrial Instrument Co. 50
Bell Diesel Research Co. 51
Bendix Aviation Corp., Eclipse Machine Div. 48
Burgess-Manning Co., Industrial Silencer Div. 56

C.A.V., Ltd. 46
Connell, W. J. Co. 58

Delco-Remy Div., G. M. Corp. 18, 19
De Laval Steam Turbine Co. 14
Diesel Energy Corp. 47
Diesel Fuel Injection Svc. Inc. 58
Diesel Injection Sales & Svc. 58

Eaton Manufacturing Co. 10
Enterprise Div., General Metals Corp. 12

Florida Diesel & Electric Co. 58

Garrett Corp., AiResearch Div. 31
General Motors Corp.
Delco-Remy Div. 18, 19
Harrison Radiator Div. 4

Harrison Radiator Div., G. M. Corp. 4
Hilliard Corp. 6

Interstate Diesel Service, Inc. 58

Kiene Diesel Accessories, Inc. 49
Kim Hotstart Mfg. Co. 57

Lincoln Electric Corp., Inc. 55
Lix Corp. 55

Maxim Silencer Co. 43
Minneapolis-Honeywell Regulator Co. 27

Napier, D. & Son Ltd. 41
National Forge & Ordnance Co. 45
Nutmeg Chemical Co. 56

Purolator Products, Inc. 9

Rockford Clutch Div., Borg-Warner Corp. 42

Snap-On Tools Corp. 23
Spray Products Corp. 51
Standard Oil Co. of California 7
Standard Oil Co. (Indiana) ..... 4th cover
Sturtevant, P. A. Co. 51
Synchro-Start Products, Inc. 57

The Texas Company ..... 2nd cover & 1

Vellumoid Co. 58
Viking Pump Co. 52

Waukesha Motor Co. 2
White Diesel, Engine Div. ..... 3rd cover
Wilkening Mfg. Co. 11
Winona Tool Mfg. Co. 55
Wyman-Gordon Co. 8

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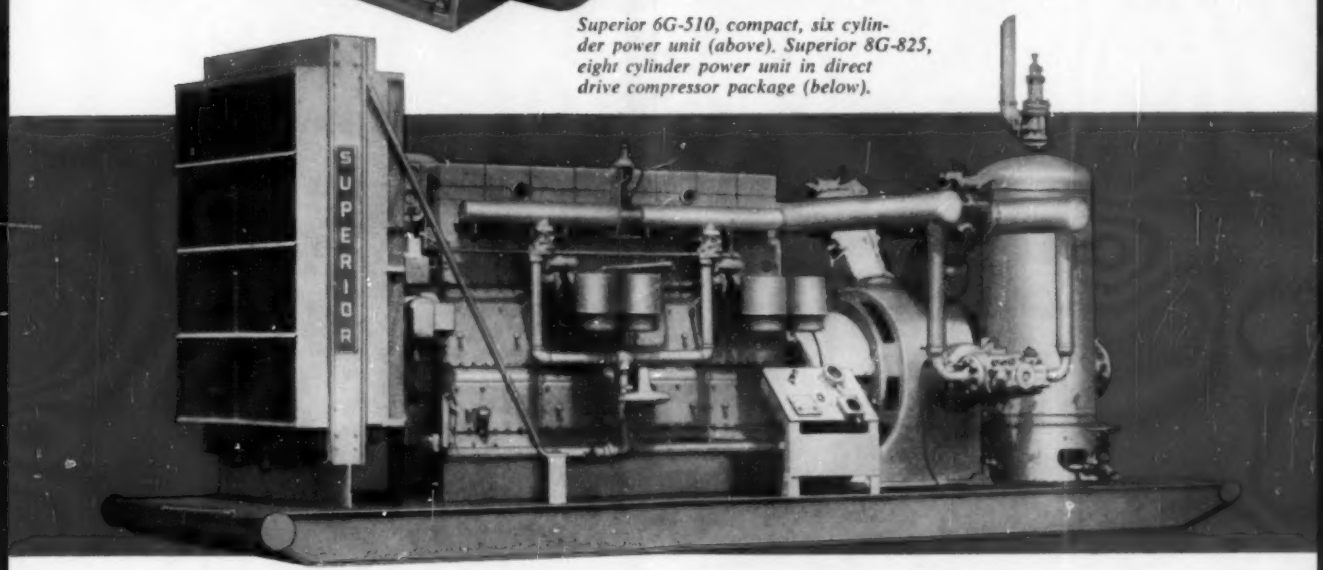

horsepower ratings

model	*cylinders*	*rpm*	*continuous*	*intermittent*	*maximum*
6G-510	6	1000	330	370	412
6G-825	6	900	465	525	590
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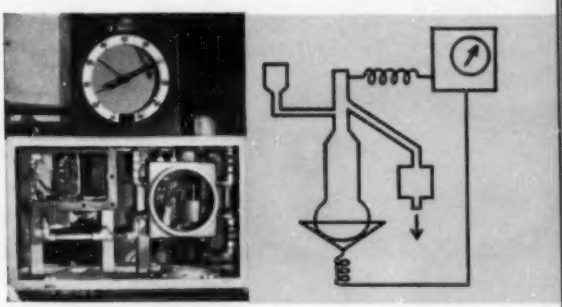

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